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Drilling Contractors' Issue

SPECIALIZED FOR EXPLORATION, DRILLING, PRODUCING, PIPE LINE OPERATIONS AND MANAGEMENT

SEPTEMBER, 1953

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A Quick Look at This Issue

BUSY OIL MEN: To help you put first things first, scan these time saving digests on this and the following pages, checking [√] those you want to read first.

CURRENT OUTLOOK

☐ **Business should hold up through 1953 . . .** then a slowdown is expected. Oil company earnings favorable in third quarter . . . oversupply threatens on West Coast . . . a new production-by-fire method . . . Williston activity gets a shot in the arm . . . Middle East gets a new producing area. See *Looking Ahead*, Page 71.

☐ **How to win friends . . .** and help students. Arabian American Oil Company is finding out that its poster information program is paying off in more ways than one. Page 83.

☐ **Gasoline Stocks are too high . . .** too much gasoline is being made by refiners . . . the record output during recent weeks almost completely stopped withdrawals from storage. The yield must be curtailed at once . . . otherwise winter gasoline markets may be weakened. Read *Report From the Observatory*, Page 96.

Turn the Page

A Quick Look . . .

. . . . drilling contractor articles in this issue

☐ **Drilling costs slow discovery rates . . .** at a time when a tremendous discovery task faces the oil industry. A concerted study of the whole problem is in order, says Editor Warren L. Baker. Much has been accomplished . . . and because progressive elements of the industry are aware of the problems, the challenge will be met. See the *Editor's Page*, **Page 73.**

☐ **Record U. S. Drilling Rates Necessary.** A greatly accelerated drilling rate has been one of the significant postwar developments of the U. S. oil industry. This expanded activity has provided the nation with the producing ability to meet the ever expanding demand. Now the prospects of even greater demand mean drilling operations must expand. Turn to **Page 74** for a prewar-postwar comparison of . . .

- Wells completed
- Footage drilled
- Average well depth
- Dry holes drilled
- Producing wells completed
- Wildcats completed.

☐ **Rising costs and lower revenue rates . . .** they are hurting the drilling contractor. His economic position continued to deteriorate during the past year. WORLD OIL Statistical Editor Cecil W. Smith has rounded up some facts and figures on . . .

- How drilling costs have risen sharply
- Contractor revenue has not advanced
- Rigs drilling more footage per month
- Substantial gain in penetration rates
- Total footage reaches a record high
- Fewer rigs are operating now.

See **Page 76.**

☐ **Contract drilling is highly competitive . . .** a WORLD OIL survey of 4767 drilling rigs shows that nearly 1000 contracting firms own almost 4000 rigs. Many own but one rig and half own less than five rigs with an average of 4.2 rigs per contractor. For other interesting phases regarding ownership of U. S. drilling rigs, turn to **Page 78.**

☐ **What the operator wants from the contractor . . .** work done without preventable loss, says a production manager of a major oil company. Safeguarding lives and property is of vital importance to the operator . . . the contractor . . . and the industry. The contractor's job ends when he has completed a well and moved his rig. But the operator must remain behind to produce the lease . . . and too often his heritage is the ill will of the landowner. **Page 80.**

☐ **The U. S. Army's loss . . .** was the drilling industry's gain when back in 1916 a terse military order from Washington converted a lieutenant from Boston into a Texas drilling contractor. *The Big Moment* in the life of A. W. (Tommy) Thompson, contractor and twice president of the AAODC. See **Page 82.**

☐ **Well completion costs are up.** Producing companies are keeping a sharp eye on the items which contribute to rising costs. One such company recently completed a cost study on 1000 wells drilled during the period from 1948 through 1952 and has pin-pointed the category of expense considered most out of line. Trends are provided that will help you analyze drilling costs. **Page 84.**

EXPLORATION ARTICLES

☐ **A down-to-earth discussion** of seismic problems and results in Kansas . . . read Bob Glover's article beginning on **Page 109.** The author shows how the services of the seismologist are well within the budget of the average small operator. A "hot shot" survey can evaluate as small a tract as 40 acres in areas where oil fields are small and locations must be pinpointed to avoid drilling dry holes.

☐ **Subsurface problems** of dip and dip-thickness can take lots of time. Here's an article that describes a special slide rule to solve such problems in double quick time. It's a real time-saver! **See Page 118.**

PRODUCTION ARTICLES

☐ **Effects of corrosion** on more than 70 installations will be viewed on the spot during the 1953 Corrosion Tour sponsored by the Permian Basin Section of the National Association of Corrosion Engineers. The dates—September 30 through October 2. Headquarters for the meeting will be in Odessa, Texas. For more details, see **Page 201.**

☐ **Long months of hard work** and 128 sets of separate test data went into the design of a new wash tank to treat the difficult crude of the Ventura Avenue field of California. A 10,500-barrel wash tank was the result. From the pilot test tank design to the finished wash tank, Author Arthur R. Williams of Shell

A Quick Look . . .

☐ **A solution to lost circulation? . . .** Aeration of drilling fluids may revolutionize rotary drilling. Here is one of the first successful applications of aerated drilling fluid and the interest shown by many contractors likely will result in refinements; but the present method has worked successfully. This is a step in the right direction toward improving deeper drilling techniques. Turn to **Page 145.**

☐ **Fluid mixers are receiving wide attention . . .** as a new development for mixing drilling fluids. Savings are possible . . .

- Through reduced mud pump maintenance.
- By having maximum mud inventory available at all times.
- Through being able to change mud weight and viscosity rapidly.

Turn to **Page 150** and find out how fluid mixers can help you.

☐ **Minimize rig down-time . . .** by following some common-sense advice on the care and maintenance of the principal rig parts. It's an article written by a man who sells and services drilling rigs and equipment. By following the simple rules he advocates, the contractor can minimize rig down-time, which cuts deep into the pocketbook. See **Page 156.**

☐ **Why modernize a rig?** The reasons are obvious. It will increase savings and improve efficiency, performance, and safety. For a detailed description of what can be done to improve a rig, turn to **Page 158.**

☐ **Selling safety to management . . .** and getting a safety program to the right place at the right time. These are the goals of the AAODC Safety Committee. Turn to **Page 168** for a brief report on the committee's aims and accomplishments by H. W. Davidson, for five years a member of the group and for three years its chairman.

☐ **Is your safety record bad?** Southeastern Drilling Company's was, too. So bad, in fact, that it was dropped by its insurance carrier. Something had to be done, but the company didn't want a cut-and-dried safety program. What was the answer? Barbecues and bonuses! **Page 170.**

☐ **Doglegs can be controlled . . .** They're headaches to the drilling contractor . . . caused by changing conditions such as a change in weight or a change in formation property. In the third and concluding part of *How to Cut Costs in Crooked Hole Areas,* diagrams are offered to show the effect of factors responsible for doglegs. This will help you cut costs in crooked holes areas. **Page 172.**

☐ **Here's what will help hauling problems . . .** transporting his rig from one location to another presents serious problems for the drilling contractor. A number of contractors were interviewed on the subject. On **Page 181** are some of their big gripes and also some suggestions for closer cooperation between the drilling contractor, the operator and state highway authorities.

Oil Company, will take you step by step through the many complex problems associated with this difficult crude. Test results, charts, diagrams and photographs of the completed wash tank are presented in Part 1 of *New Wash Tank Design,* beginning on **Page 203.**

☐ **How much water will be needed?** That's a question often asked in water-flood operations. With the exception of whether or not oil in a depleted reservoir can be economically recovered, the amount and rate of water required is the most important single factor in a water-flood. Two specialists in this field have prepared empirical relationships for making such an estimation. They're in an article beginning on **Page 214.**

☐ **The hydraulic system drives cooling fans** at a remote pressure maintenance compressor plant. Two hydraulic pumps, one reversed to become a motor, comprise the heart of this unique hookup . . . devised when conventional designs were not applicable. The system is entirely automatic. In operation 22 months, it's safeguarded against possible failures. Diagrams and photographs showing how the system is hooked up and operates. **Page 219.**

☐ **Conditioned engine exhaust gases for repressuring** oil reservoirs has been tried . . . and found practical to support a water-flood project. Availability and low solubility of the gas in crude make it useful in repressuring declining reservoirs. Proved in laboratory tests, the technique has been tried in the field. Results and procedures, **Page 224.**

Turn the Page

A Quick Look . . .

PIPE LINE ARTICLES

☐ **You can analyze natural gas in the field . . .** by building a small-diameter, two-inch-long combustion tube with an electrically-heated platinum filament. This tube has proved successful in the laboratory in single pass combustion analyses of gas. Plans are under way for a portable Orsat apparatus for rapid combustion on-the-spot analysis. **Page 247.**

☐ **Map of the Month.** Turning a 24-inch crude line and a 20-inch products into a successful natural gas pipe line system that operates in the black is quite a trick. Especially when the lines cost $143,127,000. But that's what Texas Eastern Transmission Corporation has done with the "Big Inch" and the "Little Big Inch." Map and story, **Page 250.**

☐ **He's super safe at work . . .** but on the road, what a jerk! Yes, that's Pipe Line Pete. But he'll learn . . . if he lives. You'll learn by following the misadventures of this misfit. **Page 252.**

☐ **America's newest** and first all-electric major diameter pipe line for transporting crude was dedicated last month. It's the 1149-mile, 20-inch carrier of Platte Pipe Line Company from the western edge of Wyoming to Wood River, Ill. Ultimate delivery will be 150,000 barrels daily of Rocky Mountain crudes. For story, pictures and other news of pipe line construction, see **Page 254.**

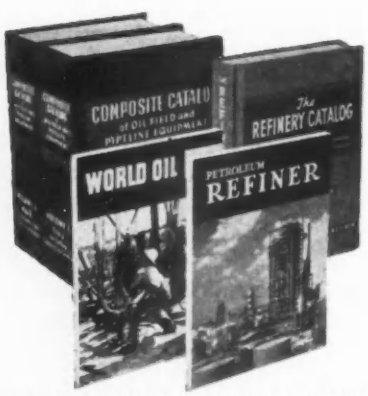
INTERNATIONAL ARTICLES

☐ **Have you ever wondered** how oil camp employes fare down amid the steaming jungles of Sumatra? A Caltex Pacific Petroleum Mij. employe says life in the equatorial jungle is one of contrasts, beauty, serenity and economic value. It's another in a series of stories on camp life around the world. **Page 265.**

☐ **Kuwaitis go to "college" . . .** Foreign operating oil companies are, in their own way, assisting greatly in foreign aid programs. See **Page 270** for an example of how Huwait Oil Company is educating young Kuwaitis for the good of themselves and their nation. And KOC benefits, too.

☐ **Big and forbidding . . .** that's Eastern Peru's Montaña. Situated in the upper Amazon basin, it's one of the biggest yet undeveloped prospective oil regions of South America. Flowing crude is there at shallow depths. But nature has surrounded the area with development obstacles that require millions of dollars to erase. **Page 272.**

☐ **A test in Sicily** is scheduled by D'Arcy Exploration Company . . . Southern California Petroleum Corporation has put its Middle East program into motion . . . USSR signs trade agreement with Albania . . . An explorable oil deposit has been reported in Yugoslavia . . . With the easing of restrictions on foreign investments, British are due to increase activity in Canada. See *WORLD of OIL*, **Page 278.**



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WORLD OIL and **THE COMPOSITE CATALOG** for the drilling-producing-pipe line industry.
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Looking Ahead . . .

. . . **Business will hold up through 1953** . . . first half 1954, economic forecasters predict . . . then a slowing down but not a depression or even a sharp recession. Continued government spending for defense and aid to free countries is expected to remain a strong support for business, bolstering civilian buying and selling.

. . . **Demand for all oils will average 8,118,000 barrels daily** for 1953, an increase of 401,000 daily or 5.2 percent over 1952, according to Bureau of Mines revised 1953 forecast. Domestic demand of 7,732,000 barrels per day would be up 6.2 percent, but exports of 386,000 would be down 11.4 percent. Crude runs to stills are estimated at 7 million barrels daily average, up 330,000 barrels or 4.9 percent from 1952. Demand for domestic crude is estimated at 6,460,000 barrels per day, up 234,000 barrels or 3.6 percent. Total imports of 1,068,000 barrels daily would be up 110,000 barrels or 11.5 percent.

. . . **Earnings of oil companies are favorable in third quarter,** following gain of about 10 percent over last year for second quarter. Results in third quarter are affected favorably by record summer demand for petroleum products and improved prices of crude and products. Second quarter was affected less by higher prices, which were not posted until June. Also, second quarter compared well with year earlier partly because of refinery strikes in 1952.

. . . **West Coast is threatened with petroleum oversupply** in latter part of this year. Stocks have not become burdensome so far but have increased over 15 million barrels since beginning of year, or at average rate of 85,000 barrels daily. At 115 million barrels at end of July, stocks were highest since start of Korean war and adequate for meeting current demand, with deficiency of past definitely eliminated. Surplus now is developing, being accentuated by West Coast foreign crude imports of about 100,000 barrels daily, while California's crude production is at record high level of about 1,015,000 barrels daily.

. . . **More than 4 billion barrels of "unrecoverable" heavy crudes** in U. S. fields may be produced, after all. Scientists of Magnolia Petroleum Company's Field Research Laboratories at Dallas hope so, through their "in situ combustion" method. In this new process they burn a part of the oil underground to thin the remainder for easier movement into wells for recovery.

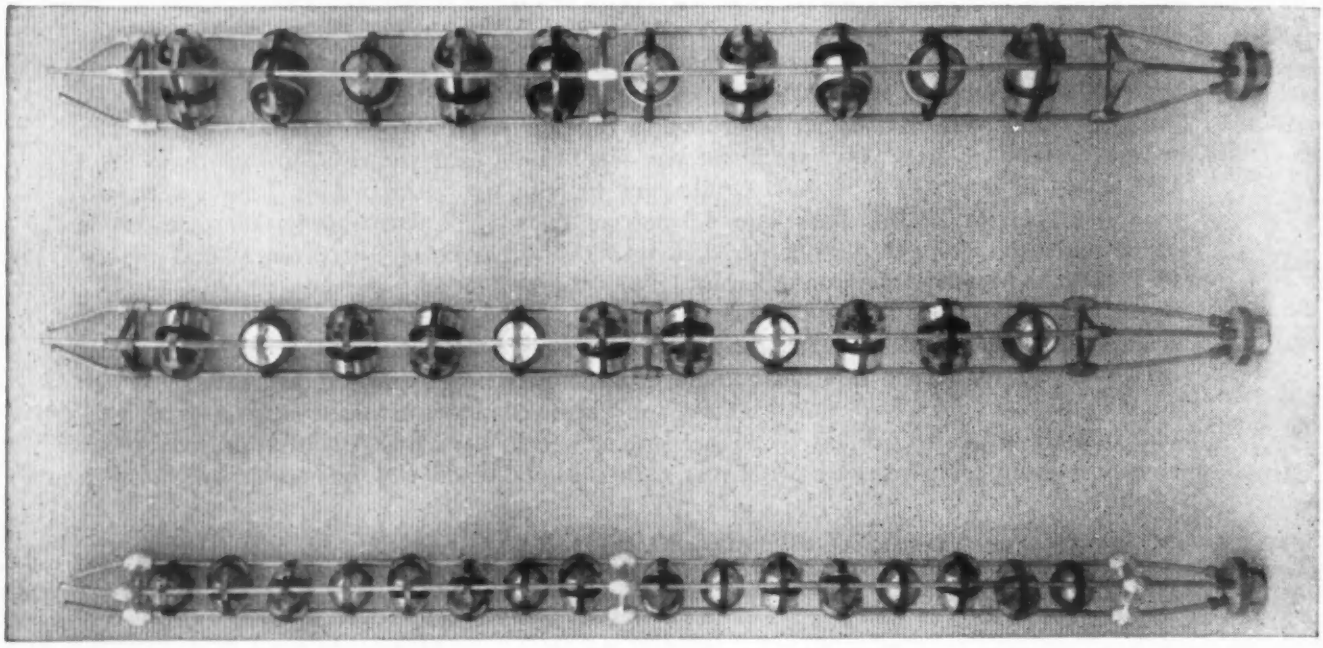
. . . **Appeal against Texas' gas gathering tax has been filed** in U. S. Supreme Court. Validity of the tax was upheld by Texas Court of Civil Appeals and also by Texas Supreme Court, after a district court ruled that the tax impeded interstate commerce and was unconstitutional.

. . . **Williston Basin activity will be stimulated** by recent discovery of oil by Phillips Petroleum Company and Sun Oil Company in Richland County, Montana, 45 miles southeast of East Poplar, nearest field. Discovery well flowed 745 barrels 48 gravity oil in 24 hours through 20/64-inch choke after acidizing Red River formation at 12,585-12,605 feet.

. . . **The Neutral Zone has come upon the scene** as a possible contributor to petroleum production in the Middle East . . . a region that already has fabulous oil producing potential. Transportation and shipping facilities are due for completion late this fall at new Wafra field of Neutral Zone, between Kuwait and Saudi Arabia. Meanwhile two producing wells are shut in, awaiting market. The third well of American Independent Oil Company and Pacific Western Oil Corporation is drilling. It is one mile south and one mile east of their second well, which can produce 1500 barrels per day from Burgan sands. The second producer was drilled on the northwest flank of the structure, 2¼ miles northwest of the discovery well, a 3500-barrel producer.

DOWELL GLASS GUN PERFORATING SUCCEEDED WHERE OTHER METHODS FAILED

Gas Well Production Increased from Show To 3½ Million Cubic Feet Per Day— Exceeding Requirements for Gas Drive Project



Dowell Glass Guns can be assembled to fit practically any well diameter that may be encountered. Three different sizes of charges permit gun construction as small as 3⅜ inches and up to 3 feet or more in diameter. Special "angle" guns shoot 30 degrees off the horizontal to penetrate shale streaks and give better formation drainage.

Here is an example of the effectiveness of Dowell's Glass Gun . . . producing results after regular bullet and steel gun jets had failed.

This well was completed as an oil well but was found to be non-profitable. It was then plugged back to a known gas zone. Several unsuccessful attempts were made to recomplete the well by perforating the 23-lb. 7-inch OD casing and the cement. Both bullets and steel gun jets, at 6 shots per foot, gave only a show of gas.

Dowell was then called to perforate with the Glass Gun. After 70 GG7 shots, at only 2½ shots per foot, the well was producing at a rate of 3½ million cubic feet per day. The remainder of the job was called off because the gas drive project required only 2 million cubic feet of gas per day.

In addition to greater penetration, Glass Guns give larger perforation hole size. They are also of value in open hole shooting because they are self-destroying and leave a junk-free hole.

Glass Guns are run on Dowell Electric Pilot equipment engineered for accurate sub-surface measuring.

If you would like to know more about this exclusive, horizontal-firing Glass Gun, the Angle-Jet Gun, the Mono-Directional Glass Gun, or any other Dowell oil field services, make it a point to contact your nearest Dowell office. Or write directly to Tulsa, Dept. **I-13.**

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Drilling Costs Slow Discovery Rate

A tremendous discovery task faces the oil industry of the U. S. Producing rates have increased so sharply it now is necessary to discover 4 billion barrels of new oil annually to maintain a normal relationship between crude reserves and production, while only 2½ billion barrels were sufficient 10 years ago.

Consumption of petroleum continues to grow, presaging further gains in production and, consequently, in discovery requirements. This need can be satisfied only through continued enlargement of drilling rates above present peak levels.

This need for drilling a larger number of wells confronts the industry with a terrific financial burden in view of the greatly increased cost of drilling and completing wells today. Means of reducing drilling costs must be found if the industry is to drill sufficient wells. No other problem is of greater importance to the industry. Cheaper drilling would lead to the discovery of enough oil to fulfill enlarged requirements of the future.

•

Many factors have contributed to the increased cost of completing wells. Labor wages and equipment costs are much higher, wells are drilled deeper, a larger portion of the wells are of the exploratory type, and many new and helpful logging, testing and coring services are in wider use.

No reduction in labor rates or equipment costs seem probable in the near future, so the answer does not lie in this direction. Neither does the solution lie in the simple reduction of footage prices paid to drilling contractors. After all, total costs of completing wells have increased sharply, although footage prices received by contractors have not advanced during recent years despite higher labor and material costs. Furthermore, the contract price today constitutes less than half the overall cost of completing wells.

Therefore, the solution lies in the development of improved methods and tools, and in better planning and programming, which will reduce the cost of both contractors and oil producing companies.

•

A concerted study of the whole problem is in order. Better advance planning of drilling programs, especially for exploratory tests, could prove helpful. Every effort should be made to keep testing and other non-penetrating operations from retarding drilling work beyond a minimum amount. Closer cooperation between contractors and oil companies could result in speedier drilling programs. Greater reliance on a contractor's judgment and know-how where he has had wide experience in an area also could prove beneficial.

Letting of multiple well contracts wherever possible would cut rig transportation costs. Liberalizing of the vertical deviation clause in some regions would prove most helpful, and some companies are doing this.

Solving the question of lost circulation, improvement of the crooked hole problem, proper selection of bits, studies to increase the efficiency of the circulating system, and extensive drilling fluid research are other phases which would help produce faster penetration rates and less hole trouble.

•

Much has been accomplished. Penetration rates are much faster today. However, there is still a long way to go.

Fortunately, an increasing number of companies have been cognizant of the problem, and are working to improve present tools and methods. From this concerted effort will come development which will cut the cost of drilling and completing wells.

Then—it will be possible to drill sufficient wells to provide enough oil for future requirements.

Warren L. Baker

Record U. S. Drilling Rates Necessary

Far more wells and footage are required to provide sufficient producing ability to satisfy greatly enlarged consuming levels.

A GREATLY accelerated drilling rate has been one of the significant postwar developments for the oil industry of the United States.

Well completion rates in recent years have been far in excess of prewar levels. Current volumes are 50 percent above late prewar years. This expanded drilling activity has provided this nation with sufficient producing ability to satisfy sharply increased consumption. Prospective future gains in demand presage a need for further enlargement of drilling operations in the years ahead.

Every increase in consumption requires greater producing volumes, which can be provided only through the drilling of wells.

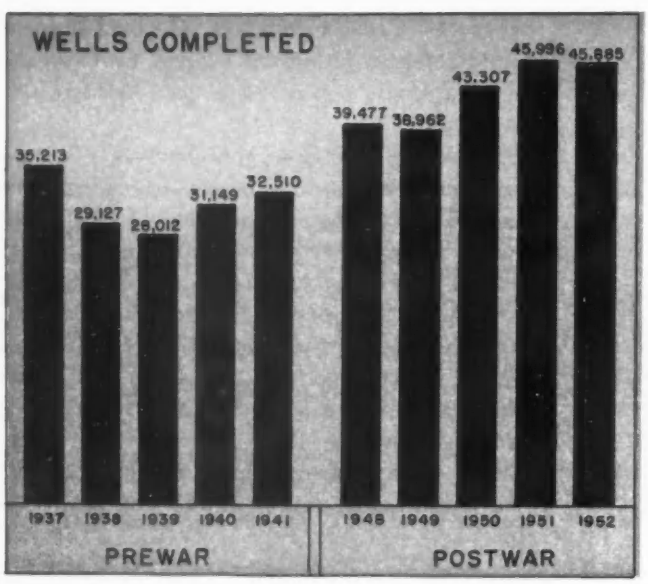
Well completion rates only partially tell the story of expanded drilling. The amount of footage drilled has increased far more swiftly than the number of wells due to greater depths. Footage in recent years has been twice that of prewar levels. The industry soon will be drilling 200 million feet yearly.

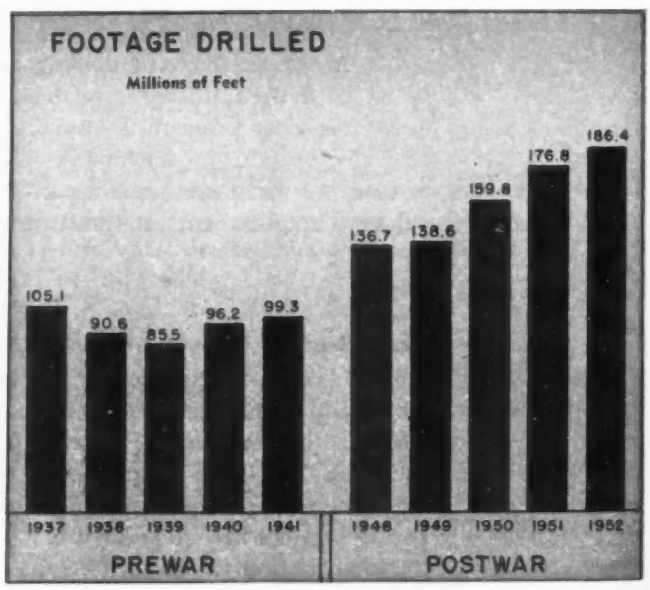
Meanwhile, faced with the necessity of discovering much larger quantities of oil to satisfy enlarged producing requirements, the industry has stepped up its wildcatting activities very sharply.

Partially as a result of greater discovery efforts, the industry is burdened with more than twice as many dry holes annually as before the war. Failures now constitute nearly 40 percent of all wells drilled in search of production.

On the other hand, producing oil wells have made up a steadily decreasing portion of the wells which have been drilled in recent years. This is an additional factor which indicates U. S. drilling rates will need to be enlarged above current peak levels in the years ahead.

The charts below and on the following page present a pictorial description of postwar trends in U. S. drilling operations.





Many More Wells Being Drilled . . .

Sharp gains during recent years have boosted U. S. drilling rates to levels approximately 50 percent greater than before the war. Nearly 46,000 wells were completed during both 1951 and 1952, and it is estimated that 48,155 wells will be drilled during 1953. These volumes have been reached in recent years only because materials have become more plentiful.

In contrast, the prewar peak was only 35,213 completions. Less than 30,000 wells were completed in both 1938 and 1939, and the annual average was less than 32,000 wells per year during the period 1937-1941.

Since higher producing rates require the completion of a greater number of wells, further growth in drilling rates seem likely.

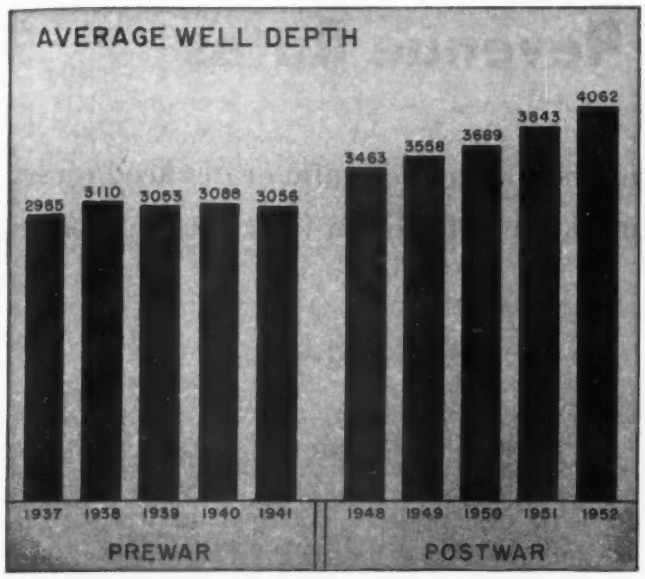
Twice As Much Footage Drilled . . .

The amount of footage drilled has increased even more rapidly than the number of wells completed annually.

Before the war it was customary for the industry to drill approximately 95 million feet of hole yearly. In only one prewar year were more than 100 million feet of hole drilled.

Since the war each year has seen a sharp gain in footage drilled, with 1952 hitting an all-time peak of 186.4 million feet, 10 million more than in the preceding year. Footage is expected to reach 192.9 million feet during 1953.

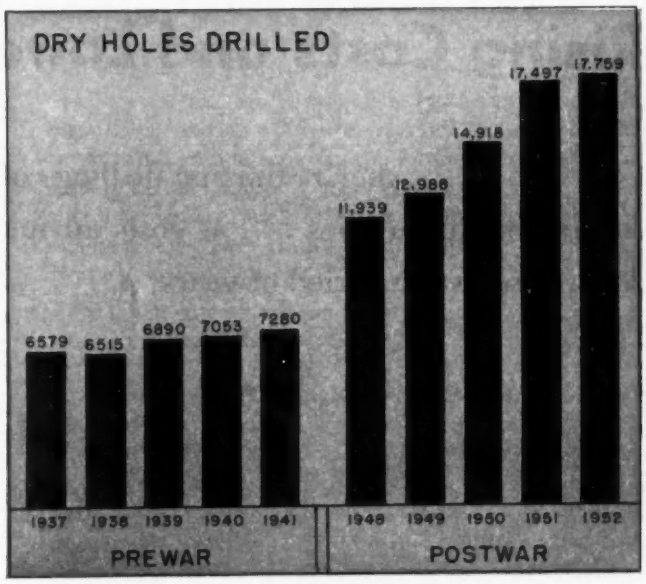
■ *Continued on Next Page*



Wells Being Drilled Deeper . . .

Greater depths are responsible for footage drilled showing a larger increase than number of wells completed. Areas with deeper producing zones have been responsible for a growing portion of the wells.

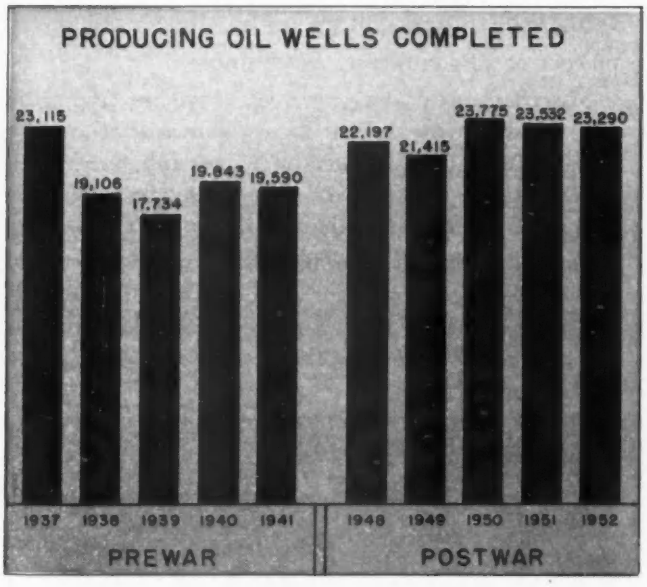
Average depth for all wells completed during 1952 was at an all-time peak of 4062 feet, compared with 3843 feet during preceding year and 3689 feet in 1950. Prior to the war, drilling averaged about 3000 feet per well.



Many More Dry Holes Drilled . . .

Nearly 2½ times as many dry holes were completed during the past two years as was customary in prewar days.

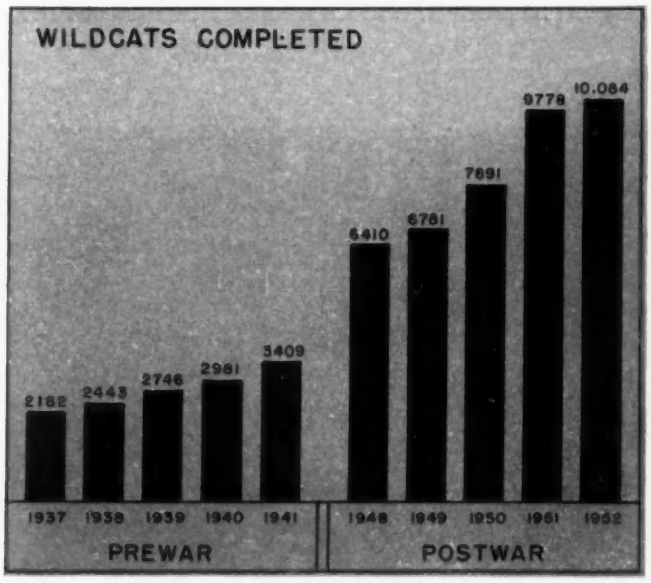
Completion of 17,500 dry holes during both 1953 and 1952 represented 39 percent of all wells seeking production. Before the war, dry holes ranged from 6500 to 7280 per year, and did not account for more than 25 percent of all wells which were drilled in search of production.



Smaller Portion of Wells Produce . . .

Enlarged drilling rates have failed to bring about a corresponding gain in number of new producing oil wells completed. Consequently, a larger number of wells must be drilled today to have sufficient producing wells.

During the past three years an average of 23,500 producing oil wells has been completed annually, only slightly over half of the wells drilled in search of production. This contrasts with the completion of about 19,000 producing oil wells in normal prewar years, when two-thirds of all wells seeking production became oil producers.



Expanded Wildcatting Program . . .

As producing rates have grown, the industry has increased its wildcatting activity. Greater wildcat drilling is a factor which contributes heavily to the number of dry holes completed annually and to drilling costs.

Last year a record 10,084 wildcat tests were drilled, whereas the prewar peak was only 3409. Wildcats accounted for over 22 percent of all wells drilled in search of production last year, whereas the prewar peak was only 11 percent. Less than 10 percent of the wells in 1937 and 1938 were wildcats.

—The End.

Rising Costs and Lower Revenue Rates

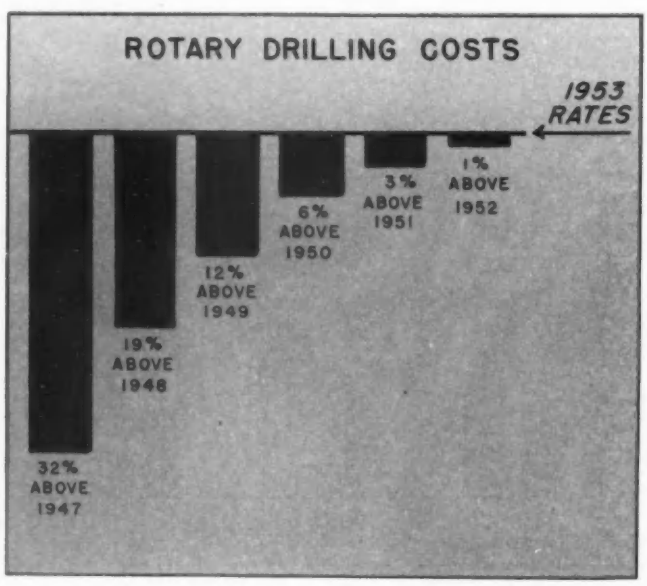
. . . they're hurting drilling contractors. Faster penetration rates keep rotary contractors in business . . . as costs advance and keen competition forces footage prices downward over a period of years.

By CECIL W. SMITH, Statistical Editor

THE ECONOMIC position of rotary drilling contractors continued to deteriorate during the past year. Contractors again were plagued with the old story of further cost increases and additional decreases in revenue per foot rates.

This same trend of higher costs and lower revenue rates has existed for some years. Consequently, contractors today are receiving less income per foot than five years ago, although operating costs have risen 19 percent during this time.

Substantially faster penetration rates have enabled contractors to partially offset this unfavorable situation and stay in business. Higher penetration rates have made possible the drilling of the record amount of footage required by the industry today despite operating a smaller number of rigs.



Rotary Drilling Costs Have Risen Sharply . . .

Over-all rotary drilling costs currently are about one percent higher than in 1953, three percent greater than in 1951 and six percent above 1950. The situation is made particularly acute because earlier years show the same trends. Since 1948 drilling costs have risen 19 percent, compared with 1947 they are 32 percent greater, while costs today are 91 percent larger than in 1941.

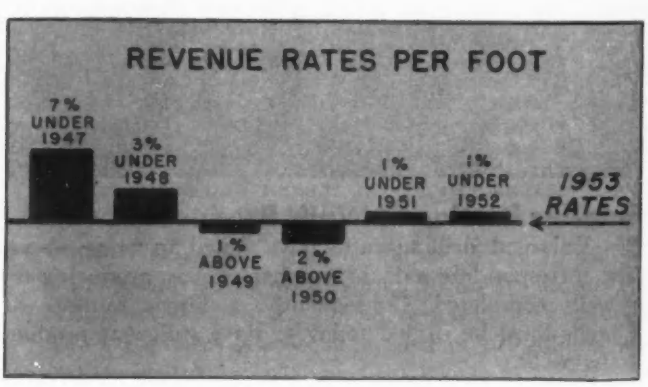
No one single item is responsible for the higher costs experienced by contractors. Increased labor, equipment and miscellaneous expenses have all been contributing factors.

Labor costs of rotary drilling contractors currently are one percent higher than in 1952, two percent above 1951, five percent more than in 1950, greater by 11 percent than in 1949, up 17 percent from 1948 and 33 percent over 1947. Labor costs are important factors, usually accounting for approximately one-third of the contractor's expense of drilling a well.

Equipment costs also have shown a sharp advance. Equipment costs in 1953 are 40 percent more than in 1947, up 28 percent over 1948, higher by 16 percent than in 1949, 6 percent greater than in 1950, 2 percent above 1951 and 1 percent higher than last year. These gains represent another important factor to the contractor, since equipment usually accounts for about 45 percent of all contracting expenditures.

Miscellaneous drilling expenses (trucking, insurance, etc.) today are 19 percent higher than in 1947, up 14 percent from 1948, greater by 11 percent since 1949, 7 percent above 1950, 3 percent higher than in 1951, and are 2 percent more than in 1952.

Deeper drilling has contributed to contractor costs. Time affects costs because most items of drilling expense are related to time. Some of the increased costs is the result of drilling a greater number of wildcat wells.

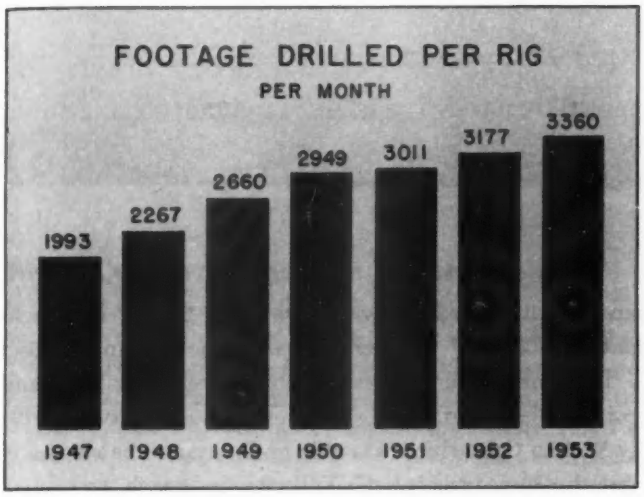


Contractor Revenue Has Not Advanced . . .

Rotary drilling contractors receive less revenue per foot drilled today than they did five years ago, despite the great increase in drilling costs. The situation of facing higher costs while receiving less income has con-

fronted contractors for some years, the accumulated influence making the present situation especially acute.

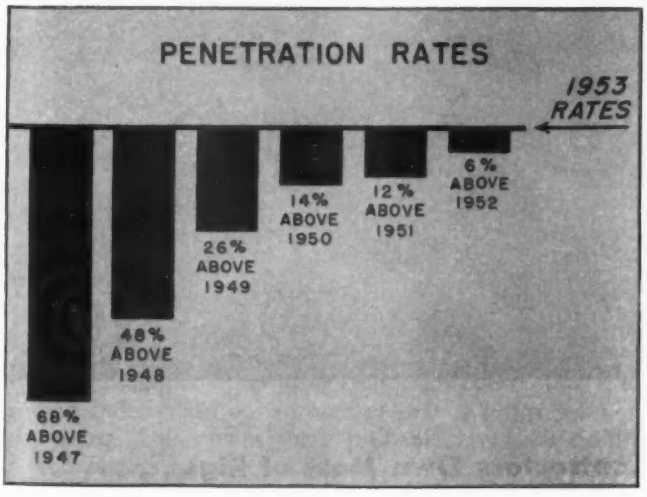
Current revenue rates per foot are 1 percent less than in 1952 and 1951, and are only 2 percent above 1950. Revenue per foot has dropped 3 percent since 1948 and 7 percent since 1947. Current income rates are only 2 percent higher than in 1941, although over-all drilling costs are 91 percent greater.



Rigs Drill More Footage Per Month . . .

Much faster penetration rates are reflected by the drilling of far more footage per month today by the average rig. A study of the footage drilled per month and the average number of rigs in active operation (both cable tool and rotary) reveals that much more footage now is being drilled in a rig month than five years ago.

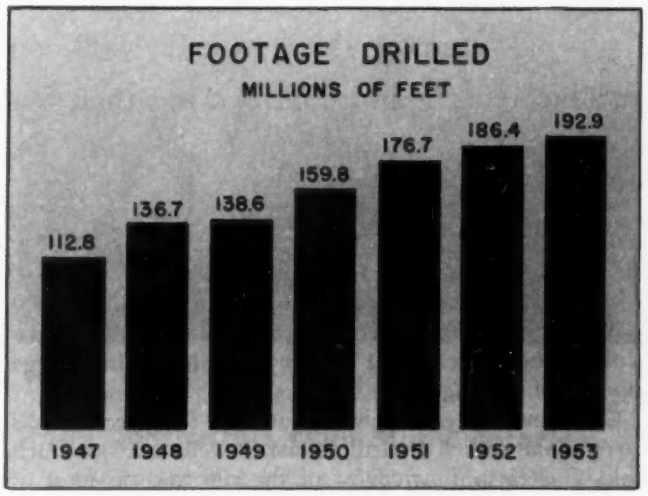
In 1947 the footage drilled per month per average rig in operation was only 1993 feet. This has increased steadily until 3360 feet were drilled per month per average rig during the first half of 1953.



Substantially Higher Penetration Rates . . .

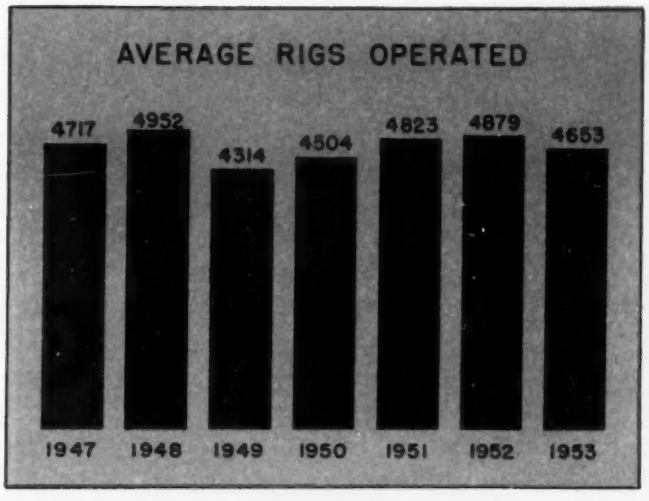
The increase in footage drilled per month by the average rig represents a substantial gain in penetration rates. The 1953 rate of drilling 3360 feet per month per average rig represents a 5.8 percent advance over 1952, a gain of 11.6 percent since 1951, and 48.2 percent more than in 1948 and 68.6 percent over 1947.

Many factors are responsible for faster penetration rates. Chief causes are better equipment, more efficient crews, and greater know-how. Improved drilling machinery, particularly in bits, and better mud control have been important influences. Contractors today experience less hole trouble and a smaller number of fishing jobs.



Record Amount of Footage Drilled . . .

Faster penetration rates have made it possible for the industry to drill a record amount of footage. The U. S. in 1953 is expected to drill 193 million feet of hole. In contrast, it drilled 186.4 million feet in 1952 and only 112.8 million feet in 1947 and 136.7 million feet during 1948.



Fewer Rigs Drill Record Footage . . .

Faster penetration rates also are reflected by a steady decrease in rigs operating despite greatly enlarged footage.

An average of but 4653 rigs were in operation during the first six months of 1953. In contrast, the average number of rigs active in 1952 totaled 4879, yet the industry is expected to drill 2270 more wells and 6.5 million more feet of hole during 1953.

Rigs were at a peak during 1948, averaging 4952 in drilling 39,477 wells and 136.7 million feet of hole.

—The End.

Contract Drilling Highly Competitive

Survey shows nearly 1000 contracting firms own nearly 4000 rigs. Many own but one rig and half own less than five rigs with an average of 4.2 rigs per contractor.

By WARREN L. BAKER, Editor

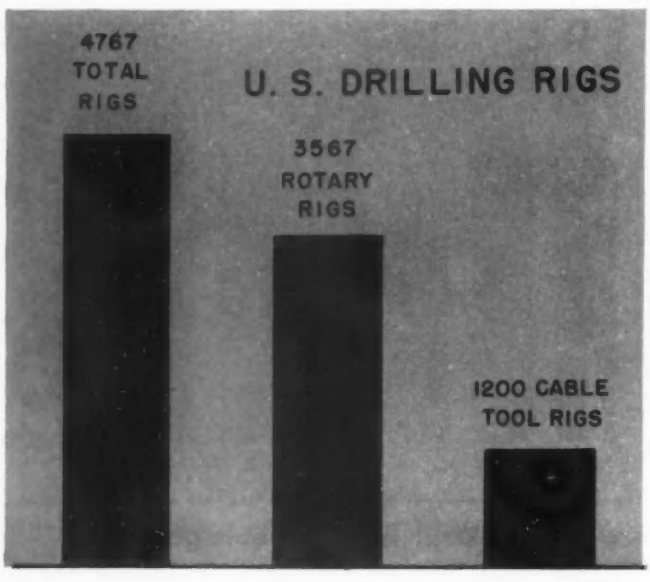
THE OIL INDUSTRY is able to drill more than 48,000 wells and over 190 million feet of hole annually in the United States because of a heavy investment in a large number of drilling rigs.

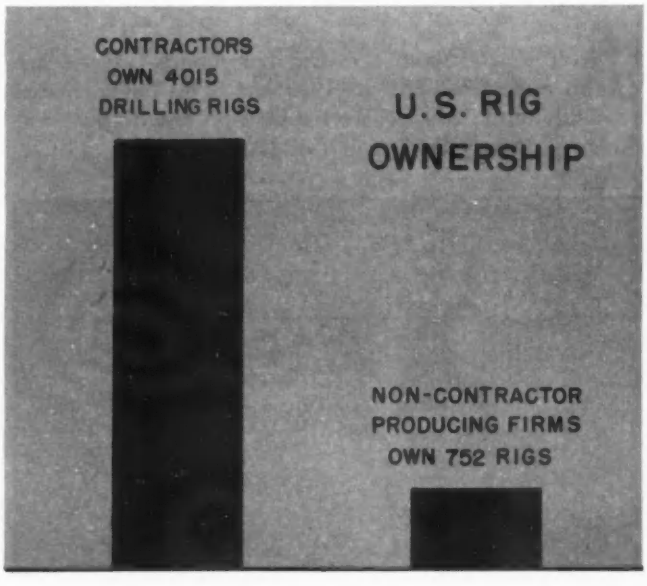
Contractors are largely responsible for the nation's exceptional ability to drill so many wells and so much hole. Contractors own most of the rigs and do most of the drilling work. The number of rigs owned by contractors is nearly 5½ times greater than the quantity owned by non-contractor oil producing companies. There are far more rotary rigs than cable tool rigs, 2½ times as many.

Rig ownership among contractors is widely diversified. There are a large number of contractors engaged in the business, two-thirds of whom own less than 5 rigs each and only a small number who own more than 10 rigs.

These and other interesting phases regarding the ownership of U. S. drilling rigs are revealed in a survey made by WORLD OIL, which was able to determine the existence and the ownership of 4767 of the industry's estimated 5250 oil well drilling rigs. These figures are exclusive of service and workover rigs, which comprise an additional large number of rigs, many of which also are owned by contractors.

Data shown in the following graphs are based on WORLD OIL's survey covering 4767 drilling rigs.



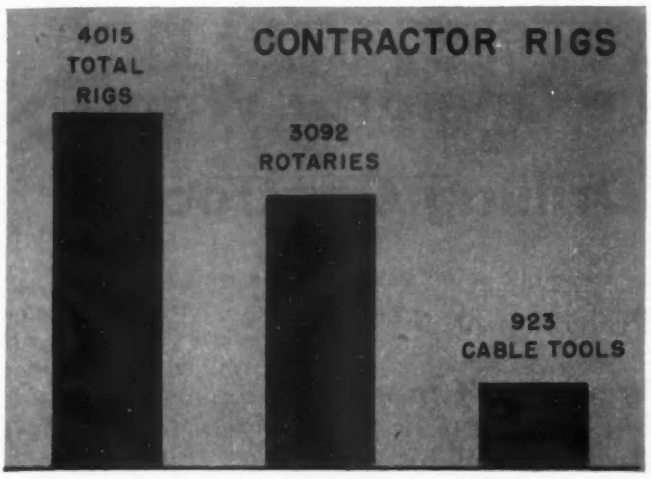


Majority of Rigs Are Rotaries . . .

Rotary rigs make up the bulk of the drilling rigs in the United States. Of the 4767 rigs covered by WORLD OIL's survey, 3567 are rotaries and an even 1200 are cable tool rigs. These figures would indicate the nation has about 5250 drilling rigs, of which 3750 are rotaries and perhaps 1500 cable tools. Service and workover rigs are not included in these figures, only drilling rigs.

Contractors Own Most of Rigs . . .

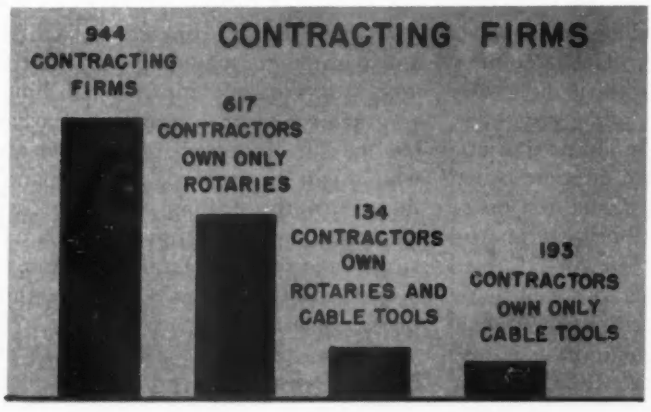
Most of the industry's approximately 5250 oil well drilling rigs are owned by contractors. Of the 4767 rigs covered by WORLD OIL's survey, contractors owned 4015 rigs, nearly 85 percent of the total. The remaining 752 rigs are owned by non-contractor producing companies, who use them to do a part of their own drilling operations.



Most Contract Rigs Are Rotaries . . .

A vast majority of the rigs owned by contractors are of the rotary type. Of the 4015 rigs owned by drilling contractors reporting in the survey, 3092 are rotaries and 923 are cable tools. Thus, three-fourths of all the rigs owned by contractors are rotaries. The 752 rigs owned by non-contracting oil producing companies also are mostly rotaries, being made up of 475 rotaries and 277 cable tool rigs.

These figures indicate contractors own 87 percent of the nation's 4015 rotary rigs and 77 percent of the 1200 cable tool rigs reporting to the survey.

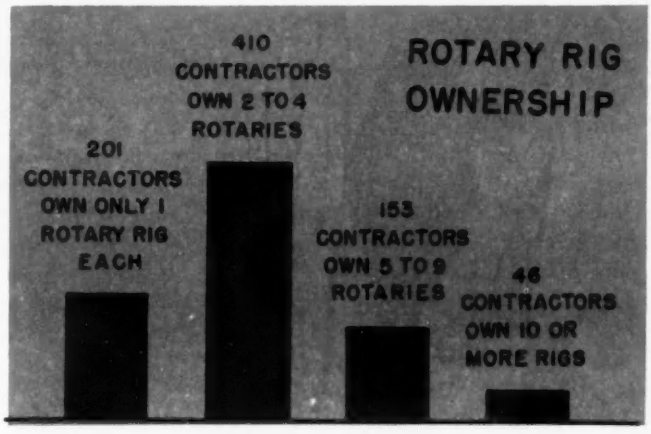

CONTRACTING FIRMS
944 CONTRACTING FIRMS
617 CONTRACTORS OWN ONLY ROTARIES
134 CONTRACTORS OWN ROTARIES AND CABLE TOOLS
193 CONTRACTORS OWN ONLY CABLE TOOLS

Large Number of Contractors . . .

The highly competitive nature of the contract drilling is shown by the existence of a large number of contractors. The survey showed that the 4015 contractor-owned rigs belonged to 944 different contracting firms and individuals, an average of only 4.2 rigs per contractor. This means there probably are 1000 drilling contractors in the U. S.

The survey also revealed that:

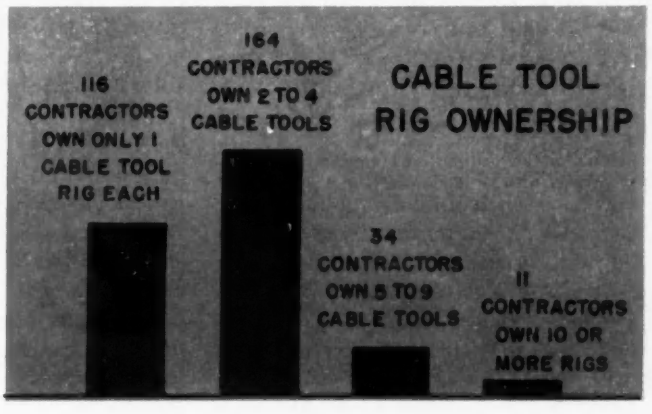
- 617 contractors engaged exclusively in rotary drilling work owned 2422 rigs;
- 193 contractors engaged in both rotary and cable tool work owned 1127 rigs, of which 670 were rotaries and 457 cable tool rigs;
- 134 contractors engaged solely in cable tool drilling work owned 466 cable tool rigs.
- 194 different non-contractor oil producing companies owned 752 drilling rigs, of which 475 were rotaries and 277 cable tool rigs.


ROTARY RIG OWNERSHIP
201 CONTRACTORS OWN ONLY 1 ROTARY RIG EACH
410 CONTRACTORS OWN 2 TO 4 ROTARIES
153 CONTRACTORS OWN 5 TO 9 ROTARIES
46 CONTRACTORS OWN 10 OR MORE RIGS

Small Contractors Own Many Rotaries . . .

The competitive nature of the contract drilling business is further demonstrated by the large number of small contractors. Three fourths of the 810 contractors owning rotary rigs (including 193 who also own cable tool rigs) own less than 5 rotaries each, with half of the rotary contractors owning 2 to 4 rigs each.

The rig ownership survey also revealed that only 12 contractors own more than 20 rotary rigs; 34 owned from 10 to 19 rotaries; and 153 contractors owned between 5 and 9 rigs each. Largest ownership group was the 410 contractors owning 2 to 4 rigs each; and the 201 contractors who owned only 1 rotary rig each.


CABLE TOOL RIG OWNERSHIP
116 CONTRACTORS OWN ONLY 1 CABLE TOOL RIG EACH
164 CONTRACTORS OWN 2 TO 4 CABLE TOOLS
34 CONTRACTORS OWN 5 TO 9 CABLE TOOLS
11 CONTRACTORS OWN 10 OR MORE RIGS

Cable Tool Ownership Widely Divided . . .

Cable tool rigs, like rotary rigs, are mostly in the hands of small contractors. The survey showed only 11 contractors own more than 10 cable tool rigs; and 36 owned 5 to 9 rigs each. Biggest ownership group was the 164 contractors owning from 2 to 4 cable tool rigs, and the 116 contractors owning only 1 cable tool rig each.

—The End.

"The full tragedy of Bill Smith's broken back may not be realized fully until Bill, Jr., misses a promotion 30 years later . . . because of lack of education . . . missed because of his father's accident."

Actions of the drilling crew may influence the operations with a landowner for a generation to come.

Many an operator has experienced the ire of a farmer whose prize bull got in the contractor's slush pit and "took sick and died."

What the Operator Wants From a Drilling Contractor

- **Protection of lives.**
- **Protection of property.**
- **Protection of his name.**
- **Protection of the industry.**

By A. E. CHESTER, Vice President and Manager of Production
Magnolia Petroleum Company, Dallas

WHAT THE OPERATOR wants from the drilling contractor is work performed without preventable loss.

First in order of importance to the operator is the assurance that the contractor will so conduct his operations as to protect the life and limb of any person, whether he be a member of the public, a curious stranger, an employe of the operator, or an employe of a service company. The operator's primary interest in this is not concerned with dollars and cents. His interest is primarily humanitarian. When a blowout, fire, or some other catastrophe is reported, the first question of a superior authority is, invariably, "Was anybody hurt?"

The drilling of an oil well with the machinery in use today is much different from the operation as it was conducted 30 years ago. But one thing which remains is the hazard to the employe or other persons working on or about a drilling well. Bitter experience has taught a great deal about how to prevent accidents and how to minimize their effects, yet accidents still happen.

Each accident is accompanied by a distinct social loss, both to the person legally responsible and to the person who sustains the injury. Damages or workmen's compensation benefits are poor substitutes for a hand or an arm or the paralysis resulting from a broken back; and death benefits paid to a widow or children are poor substitutes for the pay checks of the wage earner. The full tragedy of Bill Smith's broken back may not be fully realized until Bill, Junior, misses his promotion 30 years later because of the lack of an education, missed because of his father's accident. This type of economic loss is not measured in dollars and is not charged against the man responsible; and yet its effect is felt in our society.

So it bears repeating that the first and paramount reason why the operator wants safety from his drilling contractor is to protect as far as possible the life and limb of any person who might be injured at or around the site of the drilling operation, regardless of whether that person is an employe of the contractor, an employe of the operator, or a member of the public generally.

Protection of Property. The second most important reason for safety demanded of a drilling contractor is the protection of property. This may be divided into two categories: property on the surface and beneath the surface. There is always the possibility of injuring or destroying personal property such as automobiles, trucks, cattle, fences, timber, gates, or like objects by reason of careless operations around the well. This is a form of economic waste and, additionally, entails a smear upon the good name of the operator, the contractor, and the petroleum industry generally.

The second category of property damage is underground damage. The

". . . the oil industry is highly competitive . . . unless we maintain our good name with the public, sales operation suffer . . . many have experienced the ire of a family whose pecan tree was cut so a rig could be skidded . . ."

most obvious illustration is that which follows a blowout, fortunately rare. A more common example is that resulting from well completions or abandonments without proper safeguards to prevent commingling of substances from different strata.

Monetary losses for underground waste in a proven oil or gas field could well be astronomical. In this type of damage, assuming no injury to person is involved, the principal concern of the operator is the actual loss occasioned to his lease and the possible liability for damage to the mineral interest of the royalty owners and the mineral and leasehold owners on adjacent tracts. Limits of insurance coverage here are always inadequate when compared to the potential liability which an accident of this kind could impose on the operator and drilling contractor. Those who have seen the surface havoc wrought by a wild well can appreciate how numerous may be the claims from farmers for miles around who have suffered damage to crops as well as fences, farm equipment, and other ferrous objects.

But as serious as this destruction may be, the potential of it is small when compared with the underground damage which may be occurring at the same time. Recently in the Texas rice country an operator suffered a judgment loss of $100,000 where salt water seeped from a disposal pit into fresh water irrigation wells downdip and nearly a mile away. Recently, also, a Texas court reversed its long-standing rule and now permits a claimant to recover from one wrongdoer all the damage to which several wrongdoers may have separately contributed.

Protection of Name. Another form of protection which the operator expects from the contractor is from the effect which careless operations may have upon his good name. Operations in connection with oil are not complete until we have manufactured and sold as gasoline and other consumer products the production of our wells. The oil industry is highly competitive. Unless we maintain our good name with the public our sales operations suffer. A contractor's rig may be on a lease for a few months while drilling, but the operator must remain, producing the lease, long after the rig has been moved off. Unnecessary lease damage, such as a fence cut and left unrepaired in moving the rig, or an extra trail used by the crew which may be the cause of later surface erosion, or the treatment which the surface owner or his tenant gets when he complains about these items—any and all of these may set the course of the operator's relations with that man and his family throughout the 20 or 30 years which follow the completion of a well. Many have experienced the ire of the family whose pecan tree was cut to enable the rig to be skidded, or whose prize bull got in the slush pit and "took sick and died."

The harm done to these claimants does not create any great immediate economic loss to the operator, who is protected by the contractor's agreement to indemnify us in dollars for claims caused by that type of conduct. But there is no way for the operator to satisfy this claimant that you, the contractor, were the malefactor and we were guiltless. He does not understand that kind of talk because he knows that he sold his lease to us and it is our well. Thus, our good name is hurt. The land and lease man who ten years after such damage comes back and tries to lease the land for a deep test will have difficulty explaining to the landowner that the contractor was alone responsible.

Protection of Industry. The fourth reason why safety in drilling operations is necessary is to protect the good name of the petroleum industry generally. In the past several years the petroleum industry, working through the American Petroleum Institute, the Oil Industry Information Committee, and the various trade associations, has expended much money and labor in developing a public relations program designed to improve its good name.

Specific acts of carelessness do not always affect the good name of the petroleum industry, but the effect is often where you least expect to find it. The attitude of a member of the Legislature toward the industry or an industry project may be attributed sometimes to an unhappy experience he had as an individual or as an attorney representing someone who has suffered damage through carelessness. You may discover it on a jury whose verdict contrary to your interests might be due to the long-forgotten act of one of your competitors. You may find it on a board of equalization which sets your taxes or a town council which has been asked to lower a curb for a driveway to a filling station.

These influences cannot be measured in terms of causation; that is, you cannot trace them to a given event or incident. But collectively they exert a tremendous impact upon the every-day associations within the industry. The manner in which the drilling contractor performs his con-

About the Author

A. E. CHESTER was employed by Magnolia Petroleum Company in 1919 in the cleanout tools division of the Old Desdemona district. After service in several oil fields, he was promoted in 1926 to foreman and in 1935 to district superintendent. He was transferred to the general office in Dallas in 1944 to serve as assistant manager of production and became vice president and manager of production on January 1, 1948.

". . . only half the insurance dollar goes to pay actual losses . . . it's good business to prevent accidents . . . for every accident prevented, the contractor saves himself $2 for every $1 the accident would have cost . . ."

tract has a definite influence upon the good name of the petroleum industry generally.

Now, just what is it the operator is absolutely entitled to have from a contractor to assure these safe conditions?

• First, he is entitled to have the contractor use a rig and equipment of sufficient capacity and in mechanical condition to perform the contract safely.

• Second, the operator has a right to expect the contractor to furnish adequate supervision and a properly trained crew to operate the tools in a safe manner. Drilling an oil well is a matter of teamwork. Teamwork can be obtained only from a trained drilling crew, properly supervised. The manner in which the operation is performed depends on the experience and training and mental attitude of each member of the drilling crew. Because you are an independent contractor we must rely on you to furnish safe employes, physically and mentally able to operate your drilling rig as a team under proper supervision furnished by you.

• Third, the operator can expect the drilling contractor to provide a reasonably safe working place for his own employes and those of the operator whose presence is necessary.

• Fourth, the operator is entitled to expect that the contractor will at all times have at the rig someone in authority with sufficient judgment to minimize the likelihood of incidents leading to poor public relations.

No attempt has been made here to state why the drilling contractor should be separately concerned with the results of this safety program. It goes without saying that every reason why the operators insist on safety applies to the contractor as well. Insurance costs, of course, are directly influenced by safety records.

In conclusion, attention is called to the fact that insurance is a cost-plus commodity. For every dollar of insurance premiums paid, approximately half goes to the cost of servicing the policy, while only the remaining part is necessary to pay the underwriting cost—meaning, of course, direct payment to claimants. Thus, over a substantial period of time you will pay in premiums just about twice as much as your actual casualty losses. Why twice as much? Because only half of the insurance dollar goes to pay these costs. This being true, it is good business for you to try to prevent accidents, knowing that for every accident prevented you save yourself two dollars for every dollar the accident would have cost you.

The operator has every right to expect the contractor to save on that type of expense, just as he has the right to expect savings on drilling mud or any other cost incident to drilling. In the final analysis, all these costs are reflected in the contractor's per-foot and day-rate prices, and the operator pays the bill.—**The End.**

ACKNOWLEDGMENT

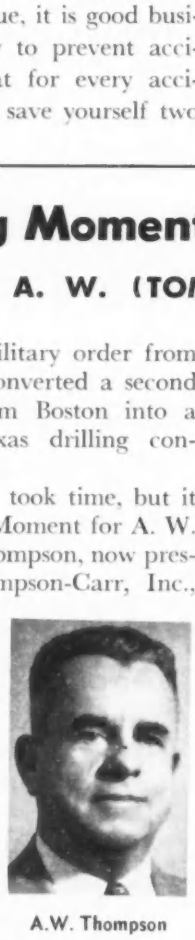
This is a condensation of a paper presented at the Eighth Annual Drilling Industry Safety Clinic of the American Association of Oilwell Drilling Contractors in Dallas.

The Big Moment . . .

for A. W. (TOMMY) THOMPSON

A TERSE military order from Washington converted a second lieutenant from Boston into a successful Texas drilling contractor.

The change took time, but it was The Big Moment for A. W. (Tommy) Thompson, now president of Thompson-Carr, Inc., when he was ordered to the Texas border in 1916.



A.W. Thompson

Until that cryptic order, Tommy was contented with a Regular Army future. But in Texas, things happened. He met men in the booming oil industry. He watched their daring. He saw them prosper or fail.

For Tommy, the die was cast. Oil preyed on his mind throughout the trials of World War I . . . front-line combat . . .wounds . . . recuperation . . . Armistice . . . and home.

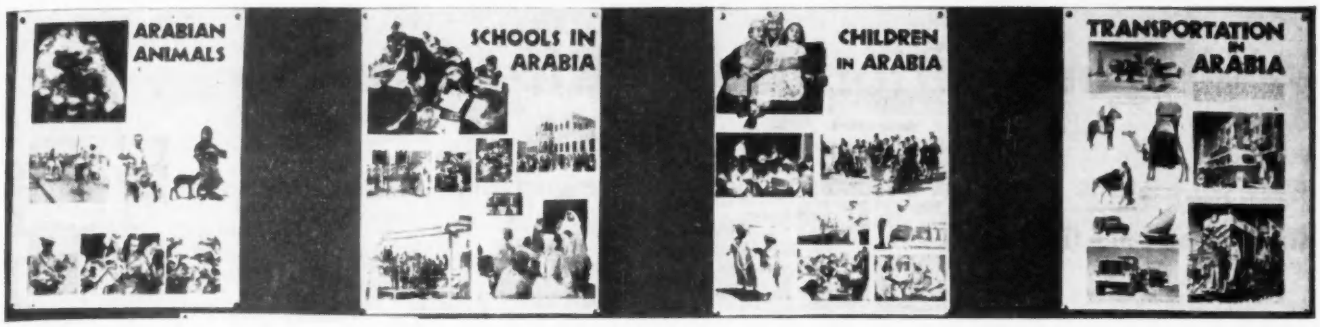
Finally, to salve his unrelenting curiosity, Tommy capitulated. He resigned his commission in 1919, and began another career. After a year's refinery stint with The Texas Company, he transferred to a subsidiary, Wolverine Oil Company in Oklahoma, where he became assistant division superintendent.

The year 1924, reasoned Tommy, seemed a good time to break into the drilling field, which promised great things for a man who'd take a chance. The rotary drilling method had begun replacing cable tools, and Tommy helped organize the Mohawk Drilling Company at Ardmore, Oklahoma. Right then, he began making a name for himself and an effort to help the industry.

Has he?

The coveted American Petroleum Institute Certificate of Appreciation awarded this twice-elected American Association of Oilwell Drilling Contractors president at Chicago in 1951 says:

"For over 20 years of skillful leadership and generous cooperation in advancing all of the major activities of the Division of Production."



POSTERS SUCH AS THESE are going to more than 27,000 schools and 8200 public libraries courtesy Arabian American Oil Company. Such a program can reap benefits by familiarizing American children with life and customs in countries around the world.

How to Win Friends ... and Help Students

Aramco is finding that its poster information program is paying off in more ways than one.

"What do Saudi Arabian children learn in school?" "What kind of animals besides camels roam the Arabian desert?" "How do people earn a living in the desert?"

The answers to these and many similar questions are not always readily available in school textbooks nor sometimes can they be found in encyclopedias. American school children in the age of the atomic bomb and a rapidly changing world are an inquisitive lot and can't always wait for new editions of geography and history books to answer current questions.

A flood of such questions received from school teachers and their pupils prompted the public relations department of Arabian American Oil Company to start a program of informing the youngsters throughout the U. S. about the Desert Kingdom of the Middle East. By means of a series of picture posters, called "The Arabian Story," young students are learning about Saudi Arabia as nature made it and how oil is changing it.

The posters, measuring 17 by 22 inches, contain an interesting array of photographs with easy-to-read captions. Each of the series touches upon some phase of life in Saudi Arabia. The topics thus far have been transportation—which runs the gamut from camels used by the Arab Bedu to modern four-motor airplanes, education, children, oil operations, local industry and other related subjects.

Interest Grows. The rapid extension of petroleum operations to the far corners of the globe has developed a great interest in people and their customs in the many lands where oil is found. The petroleum industry abroad has always played a big role in education, providing schools and teachers for employes' children and making available substantial sums to help many governments modernize and enlarge their own school systems. The industry now finds itself on entering the U. S. classroom to keep the youngsters up-to-date on progress around the world.

The picture posters started by Aramco are produced every six weeks during the school year and maintain a human interest level. Neither too involved nor too simple, they have answered a need and, at the same time, have stimulated interest among U. S. students in the Middle East, the location of more than half the known oil reserves. One poster, entitled "Exploring for Oil in Saudi Arabia," portrays with seven pictures and less than 600 words an exploration party on the desert, a diagrammatic drawing of a typical underground oil pool, the instruments used in exploration and a description of an operating drilling rig.

Aramco's first poster was issued late last year when a test mailing of 3000 went out to social science teachers of the fifth and sixth grades. The response was impressive with more than 50 percent of the teachers asking to be kept on the mailing list. More than 10 percent asked for a greater number of copies of future issues, and a large number of commendatory letters accompanied replies.

Mailing List Grows. Mailings were then stepped up and 10,000 more teachers were added to the list with each succeeding issue. In all, more than 70,000 teachers throughout the U. S. were sent one copy and advised they would be put on a permanent mailing list if they desired. More than 40 percent have specifically asked that this be done. Currently more than 27,000 separate schools are receiving individual copies and 15,000 additional copies are going out in bulk mailings as many of the children take them home to interested families.

The posters' appeal has not stopped at the school gates. The latest group to be added to the mailing list consists of 8200 public libraries. At the same time, employe interest in the posters has increased to the point where it has become necessary to include all domestic personnel of Aramco as well as the families of employes working abroad.

This direct approach, aimed primarily at familiarizing the youth of America with the life, customs and aspirations of their contemporaries half a world away, can reap tremendous benefits. If properly conducted over a period of years, the poster campaign will help new generations of Americans grow up with a far better understanding of the Middle East, the Far East and other oil-producing areas than has been possible before.

A second—but no less important—result can be accomplished in giving older people a chance to catch up on the doings in an important corner of the world which has been too long overlooked.

Well Completion Costs Rise Sharply

One company finds that the average cost per well has increased 57 percent during the past five years.

By PHILIP L. McLAUGHLIN, WORLD OIL Staff

PRODUCING COMPANIES have experienced a sharp growth in per well drilling costs during recent years. This situation, coupled with an increase in number of wells drilled, has caused drilling budgets to advance sharply. Factors increasing the per well costs include deeper drilling, more wildcat drilling, more time spent in testing, logging, surveying and other service operations, plus higher costs on equipment and materials furnished by producing companies.

Oil companies must find ways of reducing their drilling costs so they may continue to drill the growing number of wells necessary to maintain U. S. producing capacity at higher levels. However, drilling contractors are not in a position to reduce their prices. It is unlikely that labor or equipment costs will undergo any reduction in the near future.

One Company's Cost Study . . .

The average contract price has not gone up in proportion to other costs according to one major company. This company, with major holdings in the Mid-Continent, Southwest Texas, Louisiana Gulf, West Texas and New Mexico, recently completed a cost study on 1000 wells drilled during the years 1948 to 1952.

Drilling trends were computed by using the method of least squares. Data were compiled from the cost statements on wells drilled during this five year interval. No co-ownership wells were included, however, development and exploratory wells were.

This company may be considered a typical company in that its operations are widely varied in most active regions. The comparisons given below will be offered on a regional basis only, because of the representative data.

Drilling Depth Trends . . .

Currently, depths of wells drilled by this company in Southwest Texas are deeper than those drilled in other regions. This curve is shown in Figure 1.

The slope of the trend lines indicates West Texas and New Mexico will be the area of deeper drilling in late 1953, at which time these wells will average 8600 feet and will surpass the average depth of wells drilled in Southwest Texas.

In 1948 the average depth of the wells in all regions was 6000 feet. In 1952 the average depth had increased to 6800 feet while an average depth of 7000 feet is predicted in 1953. Shallow Mid-Continent production accounted for the lower depth for "all regions" trend.

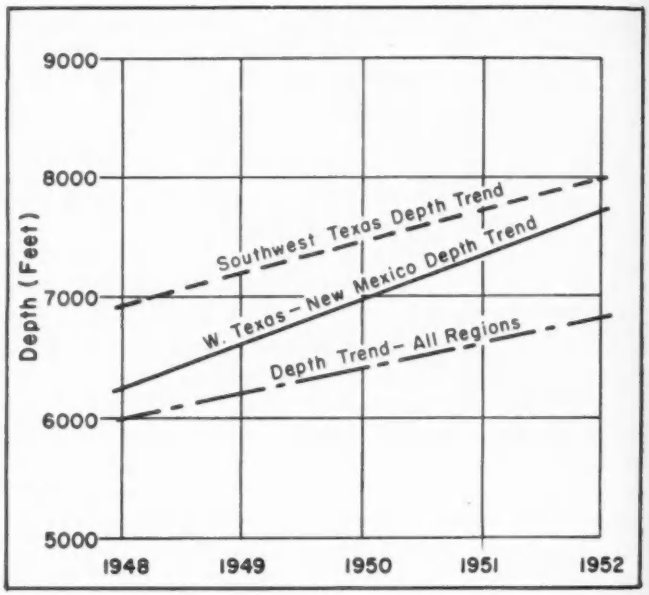


FIGURE 1

The first quarter of 1953 shows that depths of wells in West Texas are deeper than originally estimated, while wells in Southwest Texas are shallower.

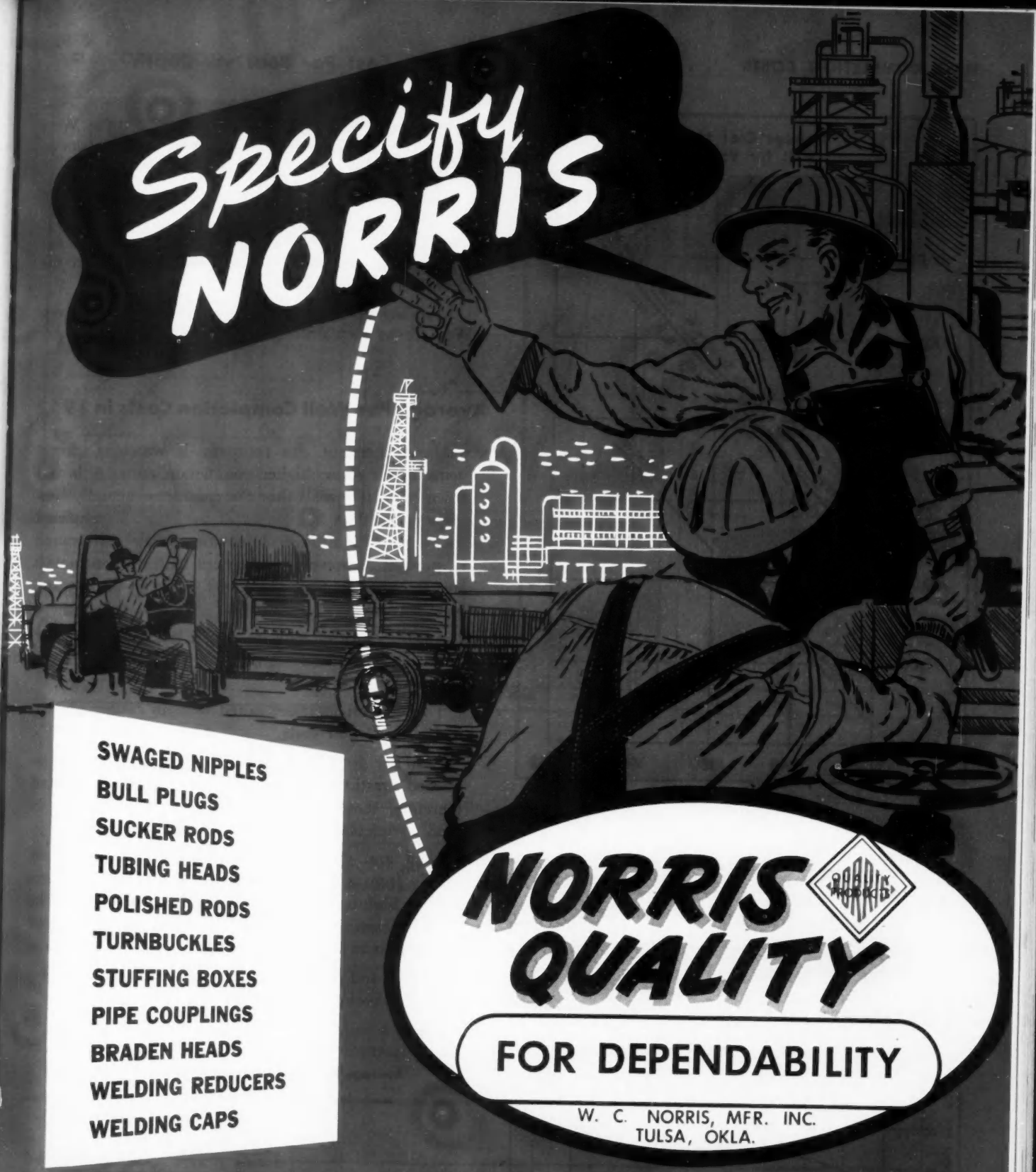
Average Cost Trend for Various Areas

Deeper drilling is contributing a lion's share to sharp increases in completion costs. The average West Texas costs per well increased from $83,000 in 1948 to $130,000 in 1952. This is an increase of approximately 57 percent in five years, as indicated in Figure 2.

It is significant to note that projections of trend lines for 1953 indicate the average cost to complete a well in West Texas and Southwest Texas will be $140,000. The first quarter of 1953 averaged only $130,000. A cheaper drilling trend is indicated here.

Much credit for this reduced price can be contributed to the fact that drilling was slow in general and contractors have reduced prices to keep their rigs active. Some companies feel that costs are now at 1951 levels.

■ CONTINUED ON PAGE 86



- SWAGED NIPPLES
- BULL PLUGS
- SUCKER RODS
- TUBING HEADS
- POLISHED RODS
- TURNBUCKLES
- STUFFING BOXES
- PIPE COUPLINGS
- BRADEN HEADS
- WELDING REDUCERS
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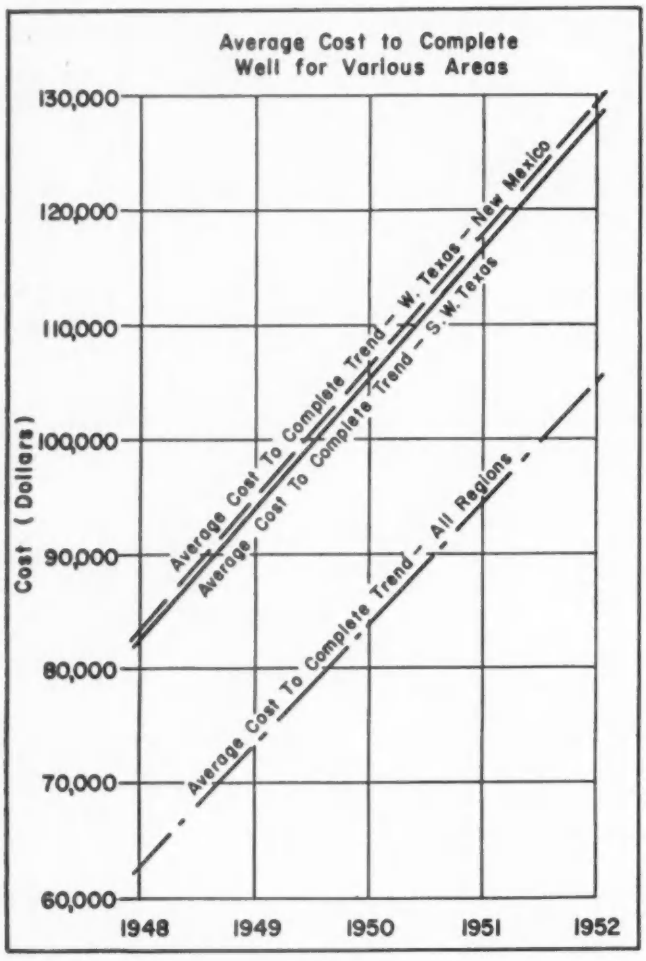


FIGURE 2

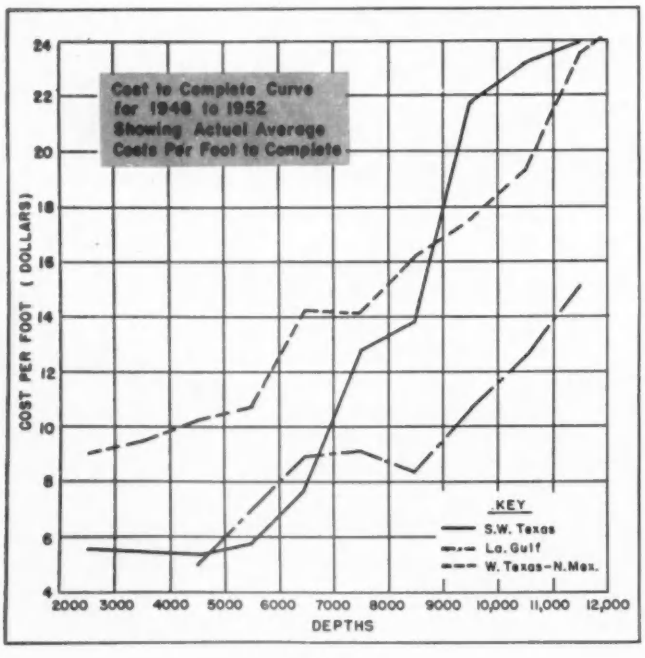


FIGURE 3

Average Cost Per Foot vs. Depth

Figure 3 reflects the influence of formations penetrated and greater cost of deep wells. On the West Texas-New Mexico curve a breakover point occurs at 7900 feet where lime and dolomite are encountered.

At 8500 feet, a sudden increase is reflected in the Southwest Texas curve.

If a well is to be drilled deeper, setting casing causes this increase. This break also is demonstrated in the Louisiana Gulf wells.

Mudding up and use of chemicals affects all curves. West Texas deep drilling indicates a continual climb.

Average Per Well Completion Costs in 1952

Management of this company is watching closely items which cause higher completion costs. A breakdown of costs reveals that the contractor actually contributes less than 50 percent of the over-all completed well costs. The average of "all areas" has been around 42 percent; however, 1952 prices indicate contractors are accountable for 56 percent in West Texas and New Mexico.

Any category of expense which tends to be out of line can be watched more closely with this systematic cost analysis.

The greatest increases noted were in casing, testing, coring and mud costs.

Cost per foot for casing and tubing have not increased drastically in the past two or three years, and therefore, these items do not cause the sharp rise in total completion costs indicated.

Mud and chemical bills on individual wells vary widely from a low of 2 percent to a high of 33 percent in high temperature areas of the Gulf Coast. The 1952 average was 2.5 percent in Southwest Texas and 5.1 percent in West Texas, less than in preceding years.

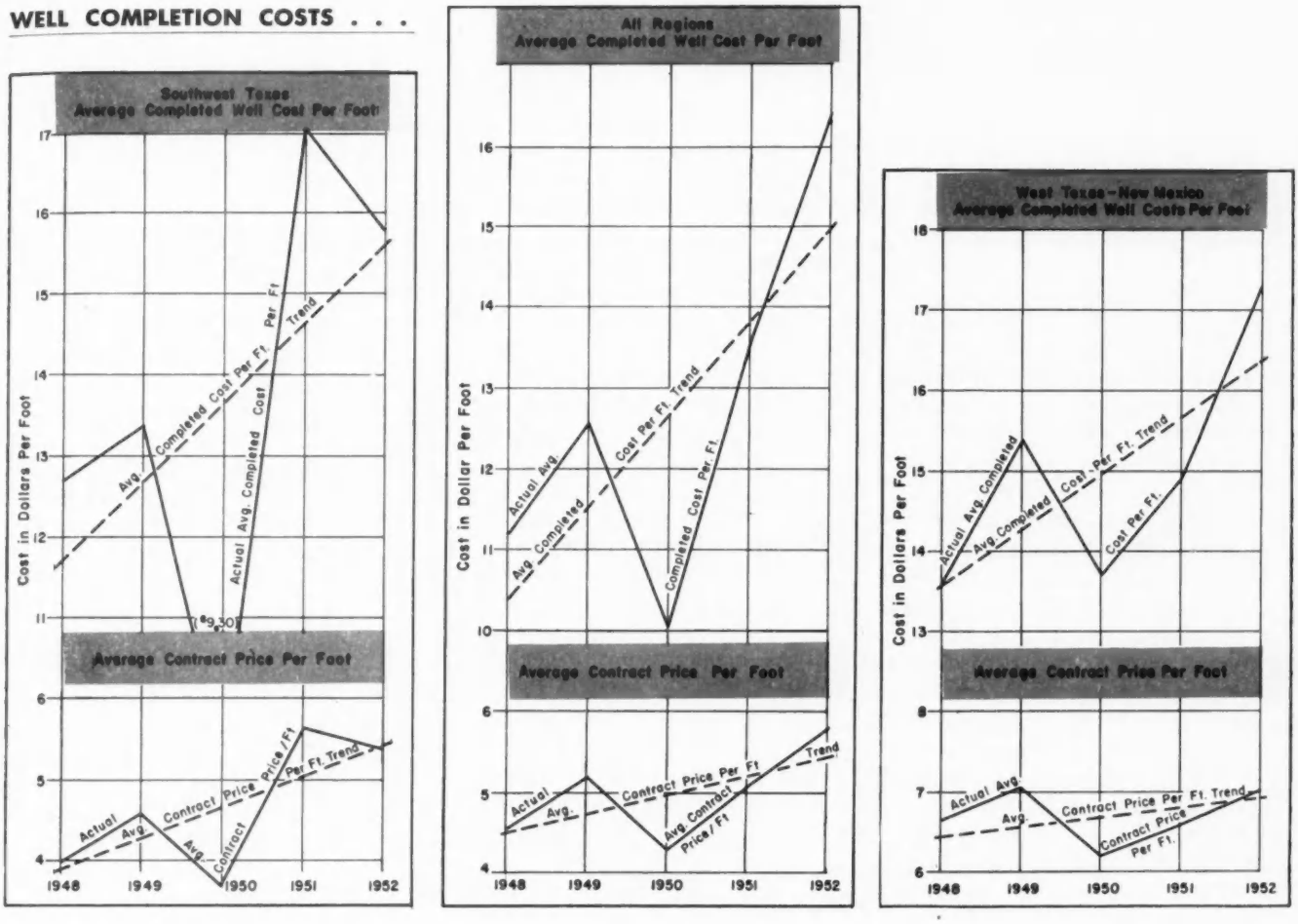
Survey and logging prices on individual wells vary from 2 percent to 12 percent of total costs.

Average Per Well Completion Costs in 1952

	SOUTHWEST TEXAS		WEST TEXAS-NEW MEXICO	
	Cost in Dollars	% of Total	Cost in Dollars	% of Total
Drilling Costs (Contractor)	41.721	38.6	93.235	55.5
Casing and Tubing	32.800	30.4	40.194	23.9
Cementing and Fees	3.555	3.3	5.466	3.3
Mud	2.712	2.5	8.599	5.1
Surveying, Logging, Coring, Testing, etc.	4.550	4.2	9.621	5.7
Well Equipment	3.745	3.5	2.422	1.4
Completion Costs	5.905	5.5	7.508	4.5
Road and Location Costs	9.138	8.5	893	0.5
Other (includes floating equipment in bays, miscellaneous charges for damages, etc.)	3.909	3.6	None	0.0
Total	107.982	....	167.938	....

■ CONTINUED ON PAGE 91

WELL COMPLETION COSTS . . .


Southwest Texas
Average Completed Well Cost Per Foot
Cost in Dollars Per Foot
Avg. Completed Cost Per Ft. Trend
Actual Avg. Completed Cost
1949-50
Average Contract Price Per Foot
Actual Avg. Contract Price / Ft.
Avg. Contract Price / Ft. Trend
1948
1949
1950
1951
1952
All Regions
Average Completed Well Cost Per Foot
Cost in Dollar Per Foot
Actual Avg. Completed Cost Per Ft.
Cost Per Ft. Trend
Completed Cost Per Ft.
Average Contract Price Per Foot
Actual Avg. Contract Price Per Ft.
Avg. Contract Price / Ft.
Trend
West Texas–New Mexico
Average Completed Well Costs Per Foot
Cost in Dollars Per Foot
Actual Avg. Completed Cost
Avg. Completed Cost Per Ft. Trend
Cost Per Ft.
Average Contract Price Per Foot
Actual Avg. Contract Price Per Ft.
Avg. Contract Price Per Ft. Trend

Average Completed Well Cost Per Foot

It is readily apparent in the above charts that the slope of the "average contract per foot" is substantially flatter than the "average completed well cost per foot" trend, which indicates that the contractors are not responsible for the sharp increases in completion costs.

• Average costs per foot in Southwest Texas have risen sharply but a notable decrease is evident for 1952. Activity in the first quarter of 1953 indicates there may be a trend toward decreased drilling costs.

• A very great increase in costs per foot for "all regions" is indicated, but the average contract price has not materially increased.

• As previously pointed out, contractors' 1952 prices for West Texas and New Mexico are cheaper than in 1949. Nevertheless the "average cost to complete" has increased rapidly.

Summary

Drilling trends help to predict future activity and to estimate costs in advance of drilling. As costs change, the trends should be recalculated. The ultimate aim of any such system is to reduce costs. To accomplish this, the solution must lie in the field of improved methods and greater efficiency. If wells can be drilled faster and with less trouble, oil company drilling costs can be reduced without hurting the contractor, equipment manufacturer or service company. **—The End.**

For more drilling contractor articles, See Pages 145-182 . . .

Next month . . . WORLD OIL's special West Texas-New Mexico Issue!

Our debt to equipment companies . . .

"I do not know of anything which more dramatically proves the debt of the petroleum industry and the American people to equipment manufacturing companies than the record of ever deeper wells.

"For if it were not for the constantly better tools, these new horizons would never have been pierced; the oil and gas at these great depths would be 'undiscovered country'; the nation would long ago have been rationed with respect to these sources of energy, and America would not be the Number One world power which it is today.

"It is as impossible to give the greater credit for petroleum's magnificent progress to either the oil operators or the fabricators of their equipment, as it is to say whether the hen or the egg came first. The Drake well would not be a famous name today if it had not been for the blacksmith, Uncle Billy Smith, and his hand-made tools. Certainly anyone who visited the International Petroleum Exposition at Tulsa could not fail to understand the important part the equipment companies have played in petroleum development."

L. S. Wescoat, Chairman of the Board of the American Petroleum Institute and president of Pure Oil Company, before Petroleum Equipment Suppliers' Association at Colorado Springs, Colorado.

New Refining Process Draws Interest

Much importance is attached to a recently publicized new refining process for converting heavy crude and residual fuel oil into gasoline and heating oils.

A new "fluid coking" process, developed by Standard Oil Development Company, subsidiary of Standard Oil Company (N. J.), will achieve such conversion of low grade oils and also produce commercial grade coke. The process is of great significance and potential value not only to refiners but also to producers of heavy crude oils, such as those found extensively in California, Arkansas, the Rocky Mountains, Mexico, Venezuela and elsewhere.

The new process will be given its first commercial application in a 3000-barrel-per-day unit already being designed for the Billings, Mont., refinery of The Carter Oil Company, another Jersey subsidiary. Esso Standard Oil Company, likewise a subsidiary of Standard of New Jersey, will apply the process in a 10,000-barrel-per-day unit at its Baltimore refinery and in a 20,000-barrel-per-day unit at its large Baton Rouge, La., refinery. The process has been in the process of development for four years and has been found successful in a large scale pilot plant at the Esso Laboratories in Baton Rouge.

"Fluid coking," said Standard Oil Development Company, "will provide oil refiners with flexible and economical means . . . of converting low value crude oil and crude fractions into automotive and home fuels."

The process is a new adaptation of the "fluidized solids" technique developed by Standard Oil Development Company in connection with fluid catalytic cracking. The company holds patents on the new "fluid coking" process and will make it available to the petroleum industry under license.

Independent producers are hopeful that the new refining process eventually will prove of benefit to them by opening up a better market for the low gravity oils that they produce or discover. The process promises to stimulate drilling by providing such markets for heavy crudes. Development now is retarded in many new fields because the discovery wells produced only low gravity oils, for which market demand is limited. There are many such fields, for example, in Arkansas, California and the Rocky Mountain states.

Independent producers doubt that this new process will affect them adversely in connection with imports. They do not see why it should stimulate imports of heavy crude and residual fuel oil as long as such oils from U. S. fields are seeking markets. Instead, domestic producers of heavy crude should benefit, it is felt.

The new refining process, like other technological advances, promises to benefit the oil consuming public as well as the petroleum industry, inasmuch as it will provide a huge addition to the reserves of raw material for making gasoline and heating oils. In that respect, the new refining process promises to be equivalent to the discovery and development of billions of barrels of new crude oil reserves. It will make available from already known crude reserves great quantities of raw material that otherwise would have to be obtained by finding costly new crude reserves.

Increase Needed

The recent advances in prices of crude oil and products were definitely essential to cover increased costs in the industry, to permit further expansion of facilities, and to stimulate exploration for needed new crude reserves.

Because of higher costs, operating profits of some companies were somewhat less in the first half of 1953 than in the initial half of 1952, despite higher gross income, crude production, and refinery runs.

It is hoped that net income in the latter half of 1953 will improve, because of better prices and anticipated higher volumes of business. Nevertheless, the higher prices will be partially offset by additional taxes and perhaps increases in other costs.

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■ **ROTARY DRILLING**
to 2,500 feet with 3½" pipe

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to 5,000 feet with tubing

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to 3,700 feet

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65-foot, self-supporting mast is carried on the truck or trailer mast supports, and can be raised and telescoped to full height in a few minutes.

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THERE IS A CARDWELL PARTS STOCK NEAR OR IN EVERY OIL FIELD OF THE WORLD.

By **RAY L. DUDLEY,** Publisher, and **WARREN L. BAKER,** Editor

Gasoline Stocks Are Too High

TOO MUCH GASOLINE is being made by refiners. Record output during recent weeks almost completely stopped withdrawals from storage. July and August are peak consuming months, and normally very heavy drafts are made on motor fuel stocks. With inventories already at the highest August level in history by substantial amounts, failure to draw heavily on stocks in the midst of the consuming season creates a serious threat of having excessive quantities of motor fuel next winter.

Refiners must immediately curtail gasoline yields. Otherwise, winter gasoline markets are likely to be weakened. The reduction of gasoline production must take place during September, when consumption will still be large enough to cause drafts on stocks.

•

GASOLINE STOCK WITHDRAWALS during the four weeks ended August 15 totaled only 243,000 barrels, an average of little more than 8000 barrels per day. Inventory drafts during this period of the year normally total 6 to 7 million barrels, an average of 225,000 to 250,000 barrels daily.

Failure to experience anywhere near normal withdrawals from storage is the result of high refinery crude runs coupled with the adjustment of yields to produce more motor fuel and less distillate fuel.

Refinery runs during the four weeks ended August 15 averaged 7,076,000 barrels per day. While this was down slightly from the daily average of 7,114,000 barrels run in the preceding four weeks, runs were still on the excessive side. However, due to higher gasoline yields, motor fuel production during the same four weeks ended in mid-August increased to 3,561,000 barrels daily, a gain of 57,000 barrels from the preceding four week period.

As a result of the extremely small reduction of stocks during the last four weeks, motor fuel inventories on August 15 amounted to 143½ million barrels. With only six more weeks of heavy gasoline consumption remaining, the industry has very little time left in which to reduce these inventories. Consequently, it appears that gasoline inventories at the beginning of the winter season will be excessive. This would result in winter additions boosting motor fuel stocks to unwarranted levels by next spring.

At the end of October, 1952, the industry had 120 million barrels of gasoline in storage, compared with 118 million in 1951. Even with curtailed yields during the next two months, end of October motor fuel stocks are likely to still be around 135 million barrels this year. Winter additions could boost them to at least 175 million barrels by the end of next March, in contrast with 163 million on March 31, 1952.

Careful regulation of refinery crude runs to reasonable levels, plus downward adjustment of gasoline yields are needed to prevent creation of disturbing and harmful market conditions.

•

ONE ENCOURAGING DEVELOPMENT the past month was the cutting of Texas' crude production allowable for September. This should have beneficial effects on the crude oil situation.

In the first reduction since April, Texas' crude oil allowable for September was trimmed by nearly 120,000 barrels daily. Texas crude purchasers made an almost unanimous recommendation to the Railroad Commission that the output of the state be reduced.

Smaller September crude production will make it possible for refiners to curtail refinery runs without causing crude to back up into storage tanks, which would be undesirable since crude stocks also are near excessive volumes in holding steadily around 280 million barrels since April.

Saves Dollars on Moves

MAYHEW'S NEW MODEL 3000 PORTABLE RIG

In moving your rigs from one location to another the man hours used are costly. With the new Mayhew 3000 that time can be reduced to a minimum.

For example, during July of this year a West Texas contractor in Callahan County, using a Mayhew 3000, moved from Warren No. 1 to Warren No. 2. From the time he started to tear down until he was rigged up and drilling for surface hole at the new location only 32 man hours had been consumed.

If you haven't received complete information on this Mayhew 3000 Portable Rig, why not write, wire, or phone us today.

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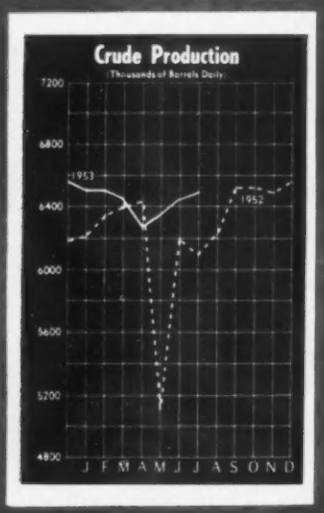
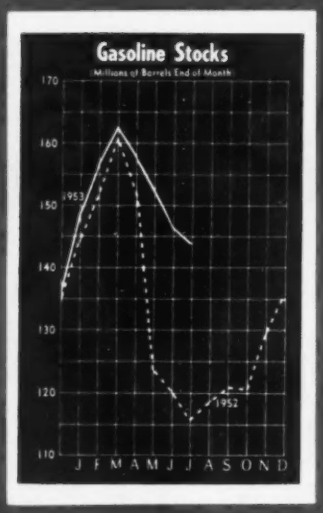
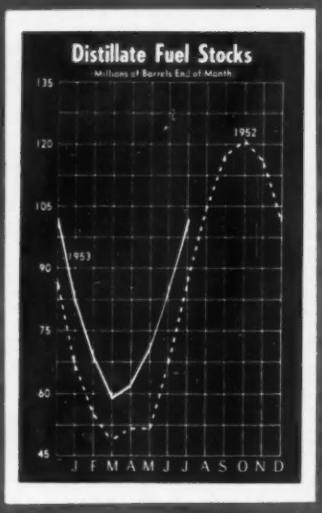
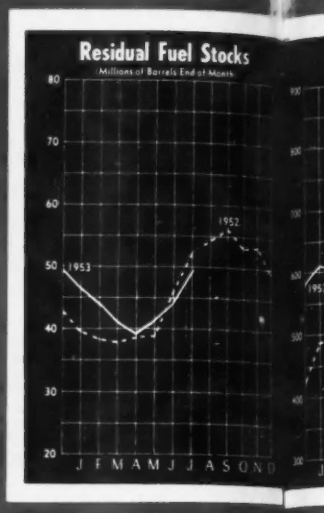
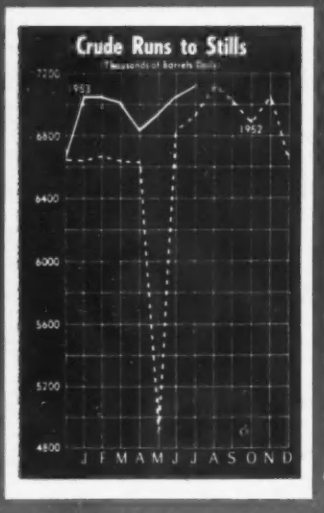
DALLAS MAYHEW TEXAS

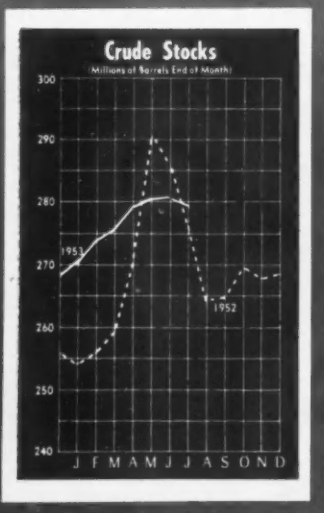












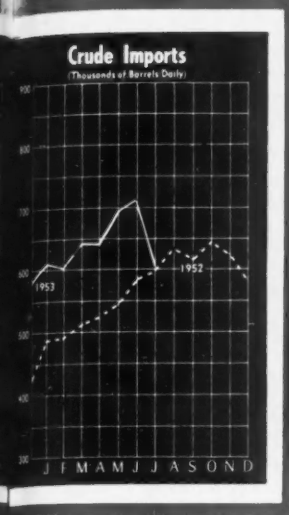
Petroleum Trends in the U. S.

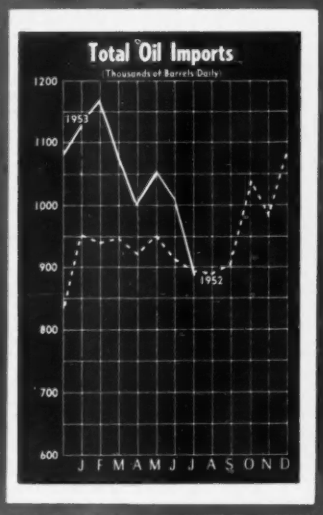
refining rates at all-time peak . . .

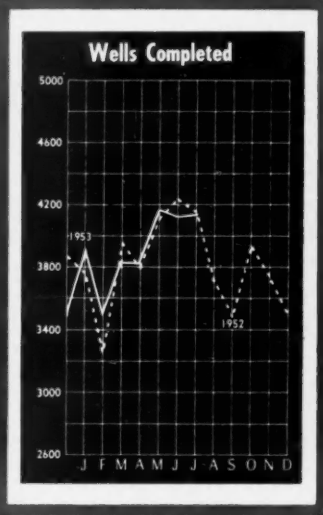
By CECIL W. SMITH, WORLD OIL Staff

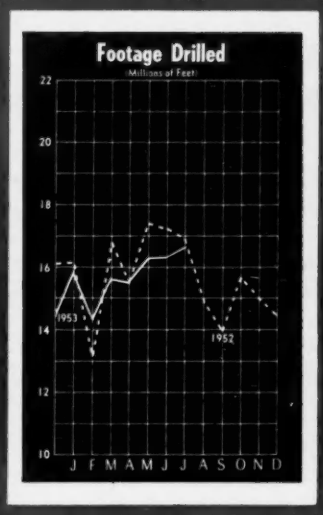
U. S. Crude Production By States
(THOUSANDS OF BARRELS)

STATE or DISTRICT	DAILY AVERAGE PRODUCTION				TOTAL PRODUCTION First Seven Months		
	July, 1953	June, 1953	July, 1952	% Diff. July, '52-'53	1953	1952	% Diff. '52-'53
Alabama	5.0	5.0	2.3	+117.4	1,017	532	+ 91.2
Arkansas	77.1	77.8	79.4	— 2.9	16,940	17,159	— 1.3
California	1,016.1	1,013.8	980.3	+ 3.7	212,206	208,770	+ 1.6
Colorado	107.7	103.5	80.5	+ 34.3	18,904	16,511	+ 14.5
Florida	1.6	1.5	1.6	.....	318	311	— 11.9
Illinois	159.7	162.9	160.8	— 0.7	34,034	33,607	+ 1.3
Indiana	35.0	35.7	35.2	— 0.6	7,662	6,841	+ 12.0
Kansas	323.9	316.5	325.6	— 0.5	69,731	63,992	+ 9.0
Kentucky	30.7	30.3	32.7	— 6.1	6,474	7,324	— 11.6
Louisiana	697.9	701.5	660.9	+ 5.6	149,200	137,322	+ 8.6
North Louisiana	108.8	113.4	111.4	— 2.3	24,257	24,952	— 2.8
South Louisiana	589.1	588.1	549.5	+ 7.2	124,943	112,370	+ 11.2
Michigan	32.6	33.8	36.4	— 10.4	7,130	7,887	— 9.6
Mississippi	96.9	98.0	96.2	+ 0.7	20,923	21,143	— 1.1
Missouri	0.1	0.1	0.2	— 50.0	11	14	— 21.4
Montana	35.2	34.8	25.5	+ 38.0	6,696	5,089	+ 31.6
Nebraska	13.7	13.7	6.8	+101.5	3,161	1,172	+169.7
New Mexico	195.2	193.2	166.1	+ 17.5	39,921	32,812	+ 21.7
New York	12.4	12.5	12.1	+ 2.5	2,375	2,514	— 5.5
North Dakota	14.1	12.0	3.4	+314.7	3,012	316	+853.2
Ohio	10.1	10.1	9.2	+ 9.8	1,976	1,851	+ 6.8
Oklahoma	542.7	534.2	541.6	+ 0.2	116,859	110,224	+ 6.0
Pennsylvania	27.5	27.5	31.0	— 11.3	6,118	6,613	— 7.5
Tennessee	0.1	.....	0.1	.....	7	6	+ 16.7
Texas	2,846.1	2,804.8	2,602.4	+ 9.4	603,093	578,760	+ 4.2
Dist. 1 South Central	38.5	36.8	31.9	+ 20.7	7,767	6,970	+ 11.4
Dist. 2 Middle Gulf	160.5	159.4	140.2	+ 14.5	33,799	32,976	+ 2.5
Dist. 3 Upper Gulf	474.8	469.2	436.3	+ 8.8	101,352	98,340	+ 3.1
Dist. 4 Lower Gulf-S.W.	271.5	264.7	229.3	+ 18.4	55,464	53,859	+ 3.0
Dist. 5 East Central	49.9	49.1	50.3	— 0.8	10,513	12,042	— 12.7
Dist. 6 Northeast	378.7	379.4	380.3	— 0.4	80,834	82,986	— 2.6
Dist. 7-B North Central	117.7	115.8	91.0	+ 29.3	23,426	18,468	+ 26.8
Dist. 7-C West Central	165.6	165.7	140.9	+ 17.5	35,104	28,674	+ 22.4
Dist. 8 West	927.9	911.4	862.0	+ 7.6	195,105	194,476	+ 0.3
Dist. 9 North	184.5	178.1	162.4	+ 13.6	38,180	33,511	+ 13.9
Dist. 10 Panhandle	76.5	75.1	81.2	— 5.8	15,905	17,430	— 8.8
Utah	4.5	5.2	5.3	— 15.1	1,097	951	+ 15.4
Virginia	0.1	.....	0.1	.....	10	6	+ 66.7
West Virginia	8.4	8.0	7.2	+ 16.7	1,612	1,515	+ 6.4
Wyoming	233.6	224.6	189.9	+ 23.0	46,595	38,079	+ 22.4
Total United States	6,528.0	6,461.0	6,092.5	+ 7.1	1,377,082	1,301,371	+ 5.8









gasoline stocks threaten to become excessive . . .

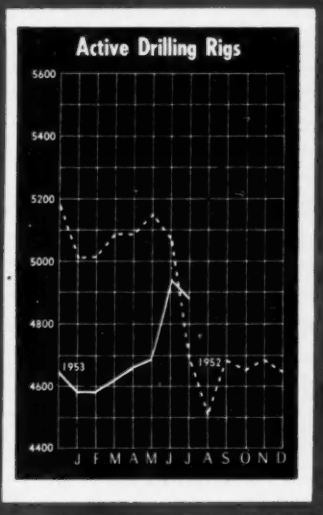
oil imports drastically reduced . . .

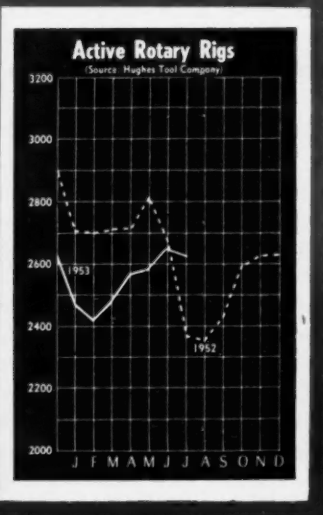
Crude Oil and Refined Products Trends

(Thousands of Barrels)

MONTH	CRUDE OIL			GASOLINE		DISTILLATE FUEL		RESIDUAL FUEL		DAILY IMPORTS	
	Production Daily	Runs to Stills Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Crude Oil	Total Oils
1951:											
June	6,130	6,575	248,170	3,100	137,000	1,254	72,140	1,277	42,398	563	876
July	6,141	6,462	250,847	3,091	130,931	1,228	84,282	1,275	46,320	546	788
August	6,232	6,539	254,276	3,114	124,202	1,237	94,028	1,226	48,365	529	780
September	6,261	6,558	254,900	3,127	124,530	1,282	104,082	1,228	49,608	500	744
October	6,375	6,446	262,266	3,105	118,864	1,295	109,544	1,224	49,573	421	769
November	6,272	6,609	261,100	3,130	122,723	1,358	101,666	1,304	46,491	425	802
December	6,182	6,646	255,783	3,150	134,867	1,442	86,619	1,313	42,853	423	834
1952:											
January	6,217	6,640	254,007	3,094	144,339	1,456	66,969	1,338	39,523	488	951
February	6,367	6,673	255,900	3,109	151,912	1,528	55,369	1,322	38,295	491	940
March	6,388	6,640	259,126	3,069	160,689	1,400	48,750	1,274	37,971	510	947
April	6,429	6,435	270,679	2,995	151,890	1,312	51,634	1,253	38,561	539	922
May	5,107	4,905	290,813	2,295	123,656	982	51,648	979	38,821	545	951
June	6,197	6,825	285,964	3,169	120,166	1,455	65,911	1,228	45,688	581	911
July	6,093	6,927	275,951	3,295	116,566	1,475	85,775	1,237	52,245	597	892
August	6,219	7,118	264,368	3,377	118,592	1,514	104,257	1,252	54,061	632	879
September	6,518	7,017	264,723	3,428	120,991	1,502	117,252	1,230	56,200	615	932
October	6,518	6,883	269,776	3,301	120,062	1,458	120,721	1,203	53,052	643	1,037
November	6,487	7,049	267,852	3,416	129,509	1,510	116,096	1,299	53,069	624	984
December	6,634	6,952	271,928	3,361	136,028	1,509	99,582	1,302	48,706	603	1,165
1953:											
January	6,555	7,042	272,250	3,384	150,518	1,528	80,655	1,307	45,910	616	1,135
February	6,562	6,969	273,589	3,379	157,873	1,505	67,167	1,275	44,178	586	1,066
March	6,531	7,002	275,665	3,319	162,731	1,489	59,802	1,256	41,600	655	1,112
April	6,446	6,781	280,487	3,282	158,032	1,424	61,349	1,219	39,572	628	1,010
May	6,390	7,002	280,308	3,459	156,415	1,400	73,706	1,197	41,795	703	1,096
June	6,461	7,071	280,785	3,462	145,907	1,480	84,478	1,235	44,087	712	1,008
July	6,528	7,120	279,140	3,530	143,426	1,463	102,003	1,256	49,453	603	890
July, 1953 Change:											
In Month	+67	+49	−1,645	+68	−2,481	−17	+17,525	+21	+5,366	−109	−118
In Year	+435	+193	+3,189	+235	+26,860	−12	+16,228	+19	+2,792	+6	−2
Week Ended:											
8-15-53	6,595	7,092	280,145	3,652	143,577	1,469	110,727	1,234	50,233	633	909
8-16-52	6,279	7,177	270,566	3,304	115,979	1,477	95,280	1,246	51,959	516	767

Source: Data for last two months from API; prior monthly data from Bureau of Mines.





Legal Barriers Are Still Holding Up Offshore Exploration

More litigation and political maneuvering lie ahead in the tidelands oil development situation. Consequently, offshore drilling may not be resumed on an important scale until the new legal uncertainties are removed.

It is expected that about eight or nine states and numerous individuals will participate in litigation challenging the validity of the new federal law recognizing state ownership of the tidelands. Arkansas has filed such a suit in federal court, and is expected to be joined in it by Alabama, Montana and West Virginia.

On the other hand, California, Louisiana and Texas, principal owners of submerged lands with good oil possibilities, are being supported in their claims by some inland as well as other coastal states. On their side is Attorney General Harold R. Fatzer of Kansas, president of the National Association of Attorneys General, and Attorney General Roy Beeler of Tennessee, chairman of that association's submerged lands committee. This association has supported state ownership throughout the tidelands controversy.

Texas is proceeding with sale of some tidelands leases.

John Ben Shepperd, attorney general of Texas, has charged that the suit field by Arkansas has no sound legal grounds; that its real purpose is to cause confusion in tidelands development until the congressional election of 1954, after which an effort could be made in Congress to repeal the present tidelands law.

Texas scheduled for sale September 1 oil and gas leases covering some thousands of acres of submerged lands off its coast. About 250 tracts of about 160 to 640 acres each were listed. They are off the coast of Jefferson County and in numerous bays, including Aransas Bay, Copano, Corpus Christi, East, East Matagorda, Galveston, Trinity, Laguna Madre, Lavaca, Red Fish, San Antonio, St. Charles, and Turtle Bays and Swan Lake. The Texas School Land Board handles the leasing. It fixed a minimum bonus of $5 per acre plus $2 annual rental for Gulf acreage.

The way has been cleared for development of the federally owned submerged areas, beyond the established state boundaries. In the closing days of its recent session, Congress passed H. R. 5134 providing for immediate leasing and administration of the federal offshore areas by the Department of Interior. President Eisenhower signed the bill on August 7. The new law authorizes the Secretary of Interior to issue new leases and to validate leases heretofore issued on the outer lands by states. He may formulate and put into effect conservation rules or may at his discretion use existing rules of adjacent states and their enforcement facilities. State laws except tax laws are extended to the federal areas if they do not conflict with federal laws. Enforcement of such state laws will be carried out by federal officers and courts.

Texas officials have expressed dissatisfaction with the hastily passed law for administering the federal lands. They have declared that possible differences in state and federal regulations would cause confusion and perhaps make state conservation powers ineffeective. Attorney General John Ben Shepperd of Texas said that H. R. 5134 "results in confusion of responsibilities and multiplied costs to the taxpayers through duplication of agencies already set up by individual states."

The Department of Interior is proceeding with plans for leasing the offshore areas and is working on rules for development. But it is confronted with various difficult problems that must be solved before development can proceed. One important problem is that of determining exactly the boundary line between state and federal submerged lands, as Congress did not draw a map to show the dividing line. Another problem is how to mark each offshore lease, out in the ocean. It is possible that public hearings may be held by the Department of Interior in order to bring out advice and objections from all parties concerned.

Spraberry to Get Needed Pipe Lines

Natural gas pipe lines will provide enough capacity by next January to take all the gas produced by the big Spraberry field of West Texas. Two pipe line projects now under construction will make capacity equal the gas output of the field in its present stage of development.

El Paso Natural Gas Company's system now has capacity for taking 114,250,000 cubic feet daily, and additions to provide 130 million cubic feet more capacity will be completed in November or December. This information was given to the Texas Railroad Commission by Paul Kayser, president of the company. The gas will be moved to western states, including California.

Permian Basin Pipe Line Company will complete by the end of this year a new system to receive 225 million cubic feet of gas per day from the Spraberry area. This gas will go to markets in the Middle West.

When the Spraberry field was closed down by the Railroad Commission April 1, about 220 million feet of gas per day were being wasted, and 60 million feet were marketed.

Following the nullification of the shutdown order by the courts, because of applying to non-flaring as well as flaring wells, the commission has issued orders allowing oil production by Spraberry wells having market outlet for gas produced. The commission has said that gas flaring will be prohibited under all future orders.

In late July the Railroad Commission decided after a hearing to separate the Benedum-Spraberry field from the general Spraberry area for proration purposes. The Benedum section of the field was granted as many allowable producing days as other Texas fields in general, in view of having market for gas produced. In contrast, the main Spraberry field has been allowed fewer producing days than fields of the state in general, because of the present deficiency of market outlet for casinghead gas that accompanies oil production.

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Oil Industry Cheers Administration Changes in the FPC

Various important developments have occurred within the past several weeks in connection with the Federal Power Commission's control of gas companies.

On the whole, these developments were favorable from the viewpoint of the gas and oil industries, although there were some unfavorable angles in a court decision affecting FPC policies. All developments considered, gas and oil companies may logically hope that FPC policies henceforth may be more sympathetic toward their problems than in the past.

With respect to FPC activities, as in many other governmental functions, the philosophy of the Eisenhower administration apparently will replace the New Deal and Fair Deal philosophies of the Roosevelt and Truman administrations. With benefit of a five-man membership that includes two Eisenhower appointees, a holdover Republican, and one independent, FPC policies apparently will be reshaped promptly in accordance with the wishes of the American people as expressed in the 1952 election, disapproving excessive power of the state and confirming trust in free enterprise.

Experience in oil and gas industry problems will be taken into the FPC by the new member, Seaborn Lee Digby, of Monroe, La. He formerly was a member of the Louisiana Conservation Commission from 1948 through 1952. He has served on the legal committee of the Interstate Oil Compact Commission since 1948. He is an attorney and a Democrat, but is said to have supported Eisenhower for president in 1952.

The Senate on July 31 confirmed the nomination of Digby by President Eisenhower. The appointment had been approved unanimously by the Senate's committee on Interstate and Foreign Commerce on July 30, following a hearing at which no opposition was expressed. Digby succeeds Harrington Wimberly, whose term expired June 22. Digby's term of office will extend to June 22, 1958.

Digby is the second man appointed to FPC by President Eisenhower. The first was Jerome K. Kuykendall, of Olympia, Wash., a Republican, now chairman of the commission. Kuykendall was sworn in May 15, 1953, as a member of the commission replacing Thomas C. Buchanan, and was immediately named chairman of FPC by President Eisenhower. Buchanan previously was chairman. Kuykendall formerly was a member of the Washington State Utilities Commission, and as such had a record of fairness to business. He told a Senatorial committee that he favored giving consideration to replacement costs in setting utility rates. His statements also indicated that he would not be in favor of FPC regulation of gas sales by independent producers. He told the senators that he opposed attempts of government agencies to stretch or distort the intent of Congress.

The five-man FPC now includes two Republicans, Kuykendall and Claude Draper; two Democrats, Digby and Dale E. Doty; and one Independent, Nelson Lee Smith. The commission appears to have on its membership now a clear majority of "conservatives." On matters that might jeopardize or weaken the free enterprise system, FPC now may be expected to express disapproval by vote of 3 to 2, or 4 to 1, if not unanimously. Nelson Lee Smith, the Independent, recently voted on the commission in favor of allowing a gas company a better return on its investment, and less than a year ago he went on record publicly as favoring a change of FPC policy to permit a pipe line company to put the same price on gas it produces as on gas it purchases, for rate making purposes. Heretofore, FPC has forced the pipe lines to figure their own gas at depreciated original cost, which may be far below current value.

In early August, with the two members appointed by Eisenhower absent, FPC made a decision in the United Fuel Gas Company case that was widely interpreted as the adoption of a more liberal policy toward gas companies in rate making. By 2-to-1 vote the commission approved a rate increase for the company that will permit a 6¼ percent return. Heretofore, the commission has held the return between 5½ and 6 percent. Claude Draper, and Nelson Lee Smith, voted in favor of the higher rate, while Dale E. Doty voted against it, and in his dissenting opinion said he did not think the commission should decide a "matter of such importance" without concurrence of a majority of the full commission. It is believed likely, however, that Chairman Kuykendall and Commissioner Digby also will approve the more liberal policy. United Fuel Gas Company is a subsidiary of Columbia Gas System, Inc. The commission said, "the Columbia system has resisted the lure of an undue thinning of the equity and has maintained a conservative capital structure. Return should be sufficient to encourage continuation of this practice."

The FPC decision to allow a 6¼ percent return in the United Fuel case probably was determined in part by a recent court decision. In late July the Eighth Circuit Court of Appeals of St. Louis reached a decision in the Northern Natural Gas Company case that invalidated a past order of FPC holding the company's return to 5½ percent. The court called FPC "unjust and unreasonable" in setting a return of only 5½ percent for the company on its investment or rate base, rather than permitting it the historic 6 percent rate of return, because of the present lower "cost of money," or interest rate on borrowed funds.

FPC adopted this rate making policy when it handed down the Northern Natural decision over a year ago, and followed it in several subsequently handled pipe line cases. Through its decision, the appeals court has reversed FPC on this point and handed the Northern Natural case back to the commission for further action. The court at the same time, however, upheld FPC's power to suspend Northern's rate schedule for gas sold by it to public utilities for resale to ultimate consumers. The same court in the same case also made another important ruling, sustaining FPC's power to treat a pipe line company's own gas production differently from purchased gas for rate making purposes. The court upheld an FPC ruling that Northern Natural's net cost of its own production, rather than the going field price, must be

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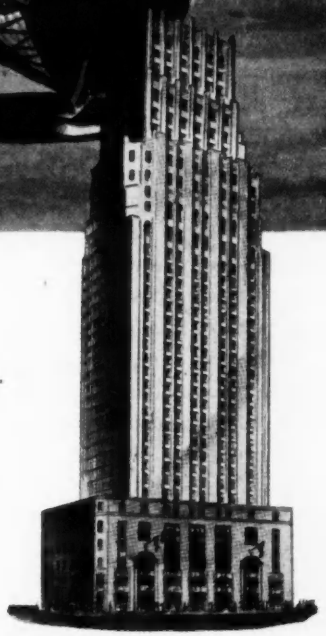

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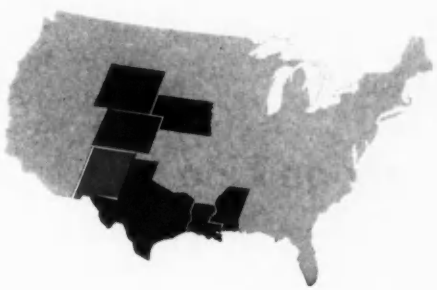

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used by the company in rate making.

For gas produced on its own properties in the Hugoton field, the company consequently must figure its wholesale gas distribution price on the basis of a cost for the gas of only 3 cents per 1000 cubic feet. This must be done although the Kansas Corporation Commission has fixed the minimum wellhead price of gas in the field at 8 cents per 1000 cubic feet. The company has contended that the gas produced by its own properties is equally as valuable as gas purchased from neighboring wells and therefore should be figured at the established field price for rate making purposes.

This policy of FPC in dealing with a pipe line company's own gas production has been a major deterrent to the finding and development of new gas reserves as brought out in WORLD OIL (July, 1953, page 71). For the long term, the policy is condemned by major gas companies as detrimental to the interests of the gas consumers, as well as the gas companies, because of discouraging the development of gas reserves and promoting ultimate shortage of natural gas.

Though upheld in court, this policy of FPC now appears to have a good chance of being abandoned by the commission, in favor of a policy of treating all gas production alike. Aiding importantly in making this change of policy would be the support promised by Commissioner Nelson Lee Smith, the Independent, who has said, "I see little logic in discriminating between the gas which an interstate pipe line system purchases and that which it produces."

Army on Line

U. S. Army engineers will build the U. S. government's $40 million, 610 mile, 8-inch products pipe line from Haines to Fairbanks, Alaska.

The line will supply military needs of U. S. and Canada and be available to meet civilian needs. Starting at the ice free port, it will run through north western British Columbia and Yukon territory.

Markets Jumpy After Price Increase

World markets for crude oil have shown instability, following the late June increases, touched off by the average raise of about 25 cents a barrel in U. S. fields.

Similar advances were made in Venezuela and in the Middle East. But the Middle East increases failed to "stick," and were partially canceled by subsequent reductions. The sliding back of postings occurred because of competitive conditions, with large potential supplies seeking markets.

Anglo-Iranian Oil Company on July 23 cut its price of Iraq crude on the Eastern Mediterranean by 10 cents a barrel to $2.44. On July 16 it had increased the price by 25 cents. This left the net increase after July 23 amounting to only 15 cents a barrel.

Mid-East Crude Sales Company, Ltd., jointly owned marketing affiliate of Standard Oil Company of California and The Texas Company, on July 24 reduced the price of 34-34.9 gravity Saudi Arabian crude by 5 cents a barrel to $2.35 f.o.b. Sidon, Lebanon. On July 17 the company had increased the price of crude delivered at Sidon by 15 cents a barrel to $2.40. The net increase after the July 24 cutback was therefore 10 cents a barrel.

Following the U. S. crude price increases of late June, postings were similarly advanced on Western Canadian crudes July 21, and wholesale prices of petroleum products also were increased.

In late July there was considerable unsteadiness of U. S. product prices, with some refiners offering fuel oils and kerosine at 3/8 to 1/2 cent a gallon less than previously quoted prices. Even gasoline markets showed some instability, as retail price wars were in progress in New England.

Effective August 1, prices of Pennsylvania grade crudes were increased by 13 to 15 cents a barrel by the Joseph Seep Purchasing Agency of South Penn Oil Company. Bradford field and Middle Pennsylvania crudes were raised 15 cents to $4.55 a barrel, Southwest Pennsylvania 14 cents to $4.11, Eureka, West Virginia, 14 cents to $4.05, and Buckeye, Ohio, 13 cents to $4.04.

Pennsylvania grade crudes previously were raised 15 cents on Feb. 16, 1953, when price controls were eliminated. In the postwar period, Bradford crude fluctuated from a high of $5 in December 1947 to a low of $3.27 in May 1949.

Depletion Allowance Under Fire Again

As on many occasions before, oil men found it necessary at mid-August to explain to congressmen why the 27½ percent depletion allowance to oil producers is both fair and essential.

The House Ways and Means Committee was holding hearings on this perennially debated subject, and the allowance was defended by various witnesses. It was upheld also by a joint statement submitted for the record by the Mid-Continent Oil and Gas Association, the Independent Petroleum Association of America, Western Oil and Gas Association, the American Petroleum Institute, and the Rocky Mountain Oil and Gas Association.

Profits of the oil industry have been reasonable, declared the joint report. Statistics for 28 years were cited, and they showed that the average return on capital invested in the oil industry was only 10.1 percent, compared with 11.3 percent for manufacturing companies.

Oil industry profits have been no greater than necessary to attract enough capital to meet the demand for the industry's products, the report stated. To assure enough petroleum for another big war, it added, it is essential to maintain rather than reduce the profitability of oil production.

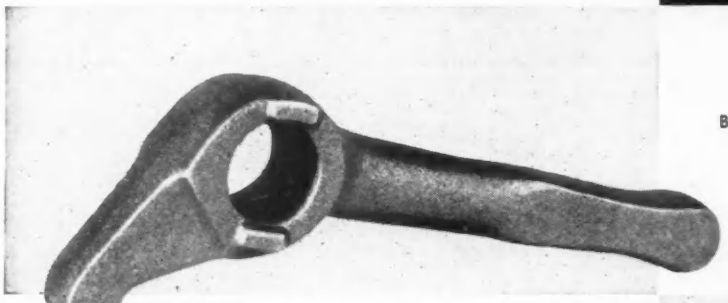
The depletion allowance was stoutly defended at the recent hearings in Washington by Lt. General Ernest O. Thompson, chairman of the Texas Railroad Commission. "This is no time," he said, "to tamper with anything that might affect our national security." He asserted that instead of changing the depletion allowance, "we should be hunting up ways to further stimulate domestic production."

RECENT INTERESTING DESIGNS

Aircraft strut part. Wt: 8 ¼ lb.

Fulcrum for internal combustion engine. Wt: 4 lb.

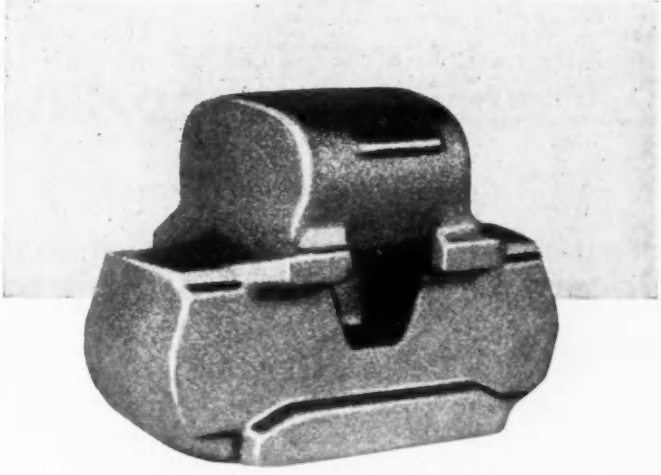
from the Bethlehem Drop Forge Shops



Arm for aircraft aileron control. Wt: 6 ½ lb.

Blank for high-speed

gear. Wt: 2 ½ lb.



Link used in coal cutter. Wt: 26 ½ lb.

Every working day of the year the Bethlehem drop forge shops turn out a steady stream of interesting designs; some simple, some complex, but all produced with the same exacting care. A recent group is pictured here, and as you can see, the pieces are meant for use in widely different industrial fields.

These of course are but a few—a tiny fraction—of the huge number of sizes and types that Bethlehem makes. We are equipped for closed-die forgings ranging in weight from several ounces to well over 200 lb—forgings available in carbon or alloy steel, untreated or heat-treated.

Why not let us see prints of the next design you expect to order? We handle all production details, including the sinking of the dies, in a way to please the most particular buyer.

Bethlehem facilities for the making of closed-die forgings include steam and board drop hammers, 1500 to 8000 lb; mechanical presses to 3000 tons; upsetters 9 in. and smaller.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

• U. S. Wells Completed in July and First Seven Months, 1953

STATE or DISTRICT	NEW WELLS COMPLETED AND FOOTAGE DRILLED															Rigs in Operation		
								TOTAL NEW WELLS			Total Footage July, 1953	DETAILS FOR JANUARY-JULY						
												New Wells			Footage			
	Oil	Dist.	Gas	Dry	Water Input	Gas Input	Water Disposal	July, 1953	June, 1953	July, 1952		1953	1952	Percent Diff.	1953	1952	July, 31, 1953	June, 30, 1953	July 31, 1952
Alabama	1			9				10	10	10	41,443	59	38	+ 55.3	298,063	221,766	7	7	4
Arizona				1				1	1		4,523	6	1	+500.0	19,960	3,544	3	2	3
Arkansas	34		1	24				59	34	36	217,341	265	228	+ 16.2	951,199	842,567	36	40	41
California	133		3	45				181	254	186	818,303	1,480	1,455	+ 1.7	6,364,262	6,080,599	260	263	247
Colorado	30		7	37				74	70	41	410,014	362	234	+ 54.7	1,812,998	1,285,631	63	53	32
Florida				2				2	5	2	18,274	20	6	+233.3	113,439	39,081	4	5	
Georgia												3			7,808		3	2	
Idaho				2				2	1		3,260	4			22,748				1
Illinois	80			92				172	169	218	459,784	1,055	1,070	— 1.4	2,651,406	2,613,742	229	201	212
Indiana	33		1	86			1	121	96	147	191,776	706	730	— 3.3	1,227,940	1,303,104	200	197	197
Kansas	157		27	149			2	335	348	445	1,154,832	2,692	2,626	+ 2.5	9,303,791	9,114,166	466	455	412
Kentucky	41		15	49				105	110	92	210,731	636	673	— 5.5	1,268,721	1,391,412	101	96	96
Louisiana	117	10	25	72				224	211	194	1,582,840	1,403	1,318	+ 6.4	10,033,314	8,861,128	248	233	217
North Louisiana	49	3	8	37				97	102	112	339,905	598	709	— 15.7	2,162,795	2,653,592	67	55	66
South Louisiana	68	7	17	35				127	109	82	1,242,935	805	609	+ 32.2	7,870,519	6,207,536	181	178	151
Maryland										2		2	25	— 92.0	8,198	99,073	3	3	16
Michigan	24		1	36				61	45	80	148,347	331	387	— 14.5	878,035	1,051,230	90	84	108
Mississippi	10	6	1	27				44	36	29	321,988	227	204	+ 11.3	1,578,533	1,477,526	30	40	36
Missouri				2				2	1	5	881	15	23	— 34.8	13,402	25,195	4	2	2
Montana	23		2	20				45	42	21	231,545	236	131	+ 80.2	1,088,860	405,600	65	67	64
Nebraska	11		1	21				33	42	11	172,067	197	99	+ 99.0	1,028,540	494,272	19	25	18
Nevada									1			6			9,050		1		1
New Mexico	69		56	28				153	135	90	784,651	851	666	+ 27.8	4,817,991	3,627,818	196	204	144
New York	53				34			87	77	106	121,331	517	567	— 8.8	722,525	789,143	109	125	115
North Dakota	10			10				20	21	2	135,201	138	28	+392.9	1,072,996	259,818	27	28	22
Ohio	44		13	24				81	79	77	151,892	552	553	— 0.2	1,141,466	1,191,774	187	177	169
Oklahoma	349	1	34	178			3	565	587	451	1,927,286	4,052	3,342	+ 21.2	14,303,888	12,658,316	601	643	550
Pennsylvania	67		8	2	57	11		145	140	145	244,002	924	967	— 4.5	1,603,663	1,645,203	283	282	266
South Dakota				3				3	2	1	12,757	8	2	+300.0	38,256	12,413	7	5	4
Tennessee																			5
Texas	784	29	75	551	3			1,442	1,451	1,647	6,765,946	9,849	11,150	— 11.7	44,921,327	53,847,099	1,299	1,376	1,393
Dist. 1 South Central	31	1	1	29				62	84	67	189,486	482	423	+ 13.9	1,555,342	1,251,955	38	36	33
Dist. 2 Middle Gulf	19	4	3	27				53	74	69	337,928	454	498	— 8.8	2,787,243	3,132,504	42	48	51
Dist. 3 Upper Gulf	76	10	9	59				154	142	131	1,070,635	971	1,076	— 9.8	6,550,005	7,134,284	136	143	127
Dist. 4 Lower Gulf-S.W.	64	12	12	61				149	145	147	909,471	1,080	1,024	+ 5.5	6,228,456	5,390,591	104	110	103
Dist. 5 East Central	8		1	10				19	24	28	92,054	181	211	— 14.2	719,518	1,094,586	13	15	33
Dist. 6 Northeast	12		14	26				52	32	54	317,421	289	347	— 16.7	1,701,954	2,142,798	48	59	30
Dist. 7-B North Central	158		6	116				280	269	239	913,079	1,822	1,700	+ 7.2	5,905,733	5,429,282	138	138	137
Dist. 7-C West Central	73	1	1	40				115	108	186	531,189	820	1,346	— 39.1	4,005,518	7,940,584	120	117	214
Dist. 8 West	138	1	2	55				196	179	346	1,177,725	1,292	2,193	— 41.1	7,399,160	12,885,462	339	353	305
Dist. 9 North	183		10	122	3			318	358	321	1,086,745	2,181	1,930	+ 13.0	7,221,845	6,164,886	248	292	269
Dist. 10 Panhandle	22		16	6				44	36	59	140,213	277	402	— 31.1	846,553	1,280,167	73	65	91
Utah			3	5				8	10	9	38,058	50	33	+ 51.5	290,097	207,479	17	14	30
Washington																	1	1	
West Virginia	6		33	10				49	56	40	139,406	354	345	+ 2.6	994,859	1,043,211	204	200	210
Wyoming	68		2	17				87	75	63	464,422	415	345	+ 20.3	2,102,098	1,776,123	115	105	79
Total United States	2,144	46	308	1,502	94	11	6	4,111	4,109	4,150	16,872,901	27,415	27,246	+ 0.6	110,689,433	112,368,033	4,878	4,935	4,694
Total Western Canada	199		20	98				317	143	179	1,244,512	1,149	995	+ 15.5	4,813,495	4,228,805	179	168	160

Record Drilling Tempo Maintained; 27,415 Wells Finaled in 7 Months

THE DRILLING TEMPO that resulted in the U. S. oil industry's setting new records in the first six months this year was carried on through July, keeping the year's operations slightly ahead of any previous period. The margin of difference between this year's wells completed in the first seven months and those of a year ago was slight, but when August's wells are counted, the gap should be widened. For it was in August of last year that the effects of the steel strike were first strongly felt.

So far a total of 27,415 new wells have been completed, and they amounted to only 169 wells or 0.6 percent more than the 27,246 recorded in the first seven months of 1952. However, up until that time, the 1952 total had been the greatest number of wells completed in any comparable period. Not only has the current drilling campaign resulted in a record-number of wells for seven months, but there appears nothing in the near future that will keep it from setting a new all-time mark of the entire year.

By the time this year's records for eight months are compiled, total wells should number almost 600 more than last year's like period. That would amount to a rise of almost 2 percent. Of course, the big gain will be caused by the sizeable drop in completed wells a year ago, when the steel strike's crippling effect on drilling was clearly reflected in August's drop to 3722 wells.

Although this year has seen a few more wells drilled, the results have not been quite as successful percentagewise as last year's efforts. In seven months, the industry completed 16,427 oil or gas producers and they amounted to 61.5 percent of the total wells drilled for production. A year ago the score had been 16,487 producers which amounted to 62.2 percent of total tests. Oil wells were the ones showing the decline. This year 53.0 percent of all wells drilled made oilers, while last year's produced 54.4 percent. Gas and distillate wells gained from 7.8 to 8.5 percent.

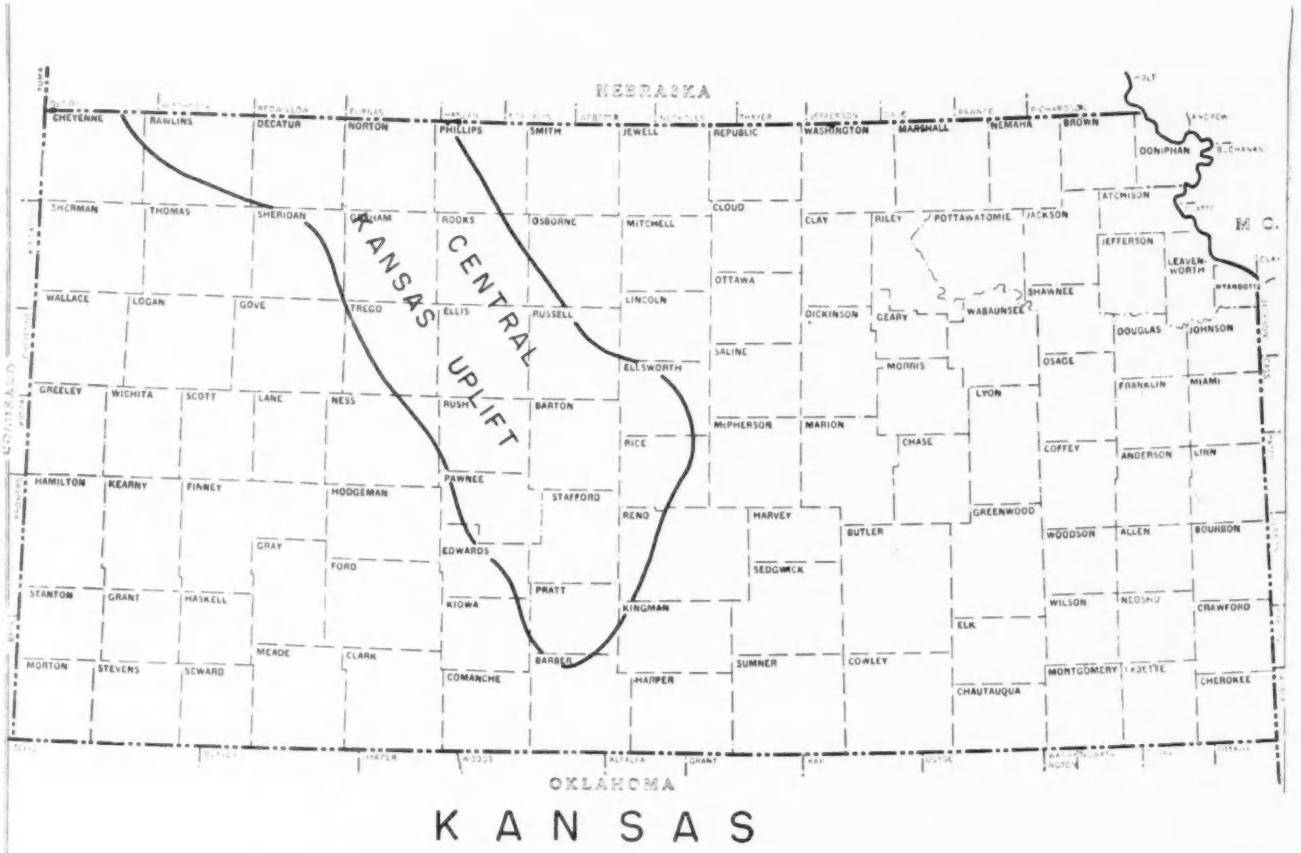


Fig. 1—Erosional anomalies on and adjacent to the Central Kansas Uplift make the location of shot holes over potential drill sites most advisable.

Seismograph Pays Off in Kansas

New oil pools have been found throughout the state in recent years through the use of seismograph. Surveys also have aided in deciding whether or not specific locations should be drilled . . . saving the cost of drilling wells that very likely would have been dry holes.

By ROBERT H. GLOVER, Central Exploration Company, Inc., Wichita, Kansas

SEISMIC ACTIVITY in Kansas has increased tremendously in the last few years. The small operator and the minor oil companies are vying with the majors in the use of the seismograph. This has been the result of two things:

- "Hot shot," or short term work, has made a crew available for as little as one day's work and in certain instances less than a day's work. The oil man no longer needs to have a crew for an excessive length of time. As a convenience, these crews are distributed across the state in such a manner that the results are generally available within two weeks' time. This is a service which is appreciated by the operator, who must "wheel and deal" quickly or who suddenly realizes that he has a lease about to expire.
- Seismograph has "paid off" for the smaller oil man in that the results of a survey when carried out in an extremely precise manner will correctly evaluate his lease or leases 80 percent of the time. Later in this article the precise manner of evaluation will be described.

The seismologist's duty is to find oil. However, to the seismologist, this particular duty involves hundreds of

tasks and problems. Only the ones peculiar or extremely important to Kansas operations will be discussed.

He needs good reliable field and office personnel. In order to maintain the high caliber of office personnel necessary, a method of "central computing" has been devised. A permanent base is established in a large city and records from the crew or crews, in any part of the state, are sent to this main office for interpretation. This method not only makes for happier and more capable office personnel, but is the answer to keeping the information secret. It also has the added advantages of offering daily supervisory attention for the party chiefs and interpreters, and of having all supervisory heads available for consultation on any single seismic problem.

In Kansas the millisecond reigns supreme. One millisecond means five to six feet of subsurface relief or of isopachous thinning. It is very often the difference between an oil well and a dry hole. It is also very often the deciding factor as to whether a well will or will not be drilled. Accuracy starts with the field and ends with the draftsman.

In topographic surveying, vertical control cannot be in error over one foot. A two-foot error means a millisecond error in computed depth. The same applies to measured distance to the "inside" geophones in certain types of computations. The accuracy of lateral control speaks for itself when the oil well is drilled directly over the seismograph shot point.

Depth of Charge. It is equally important that the precise depth of the dynamite charge be known. In Kansas a two-foot error by the shooter is equivalent to a millisecond error in datum computation. If there is any chance of doubt, the charges must be winged.

Of course, every seismologist knows that changes in reflection or record "frequency" affect the recorded time to a varying degree. In Kansas this becomes very important and it is thus quite necessary for the observer to watch the frequency exhibited on his records. He should "play the hole"; take several shots at varying depths; re-drill if necessary; re-plant geophones; vary charge size; shoot at a constant datum or depth; shoot in the same formation; in short, use every known means to achieve correlative records.

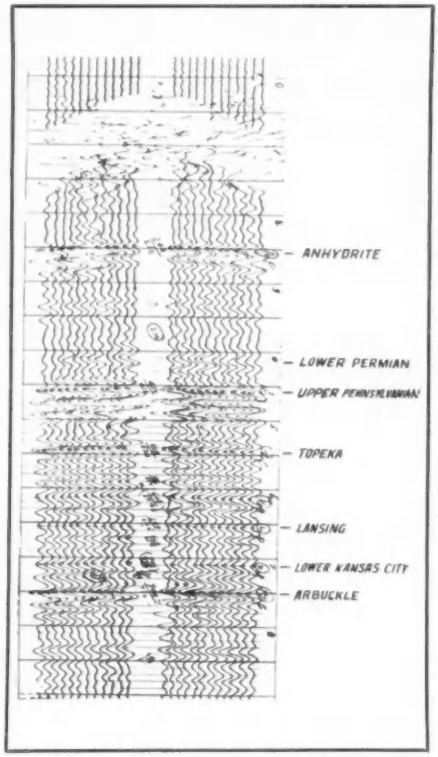


Fig. 2—Typical seismograph record in Kansas.

The same applies to "character," although of course record character may also be influenced by thickening and thinning of beds. In Kansas, this usually pertains only to the Pre-Pennsylvanian strata.

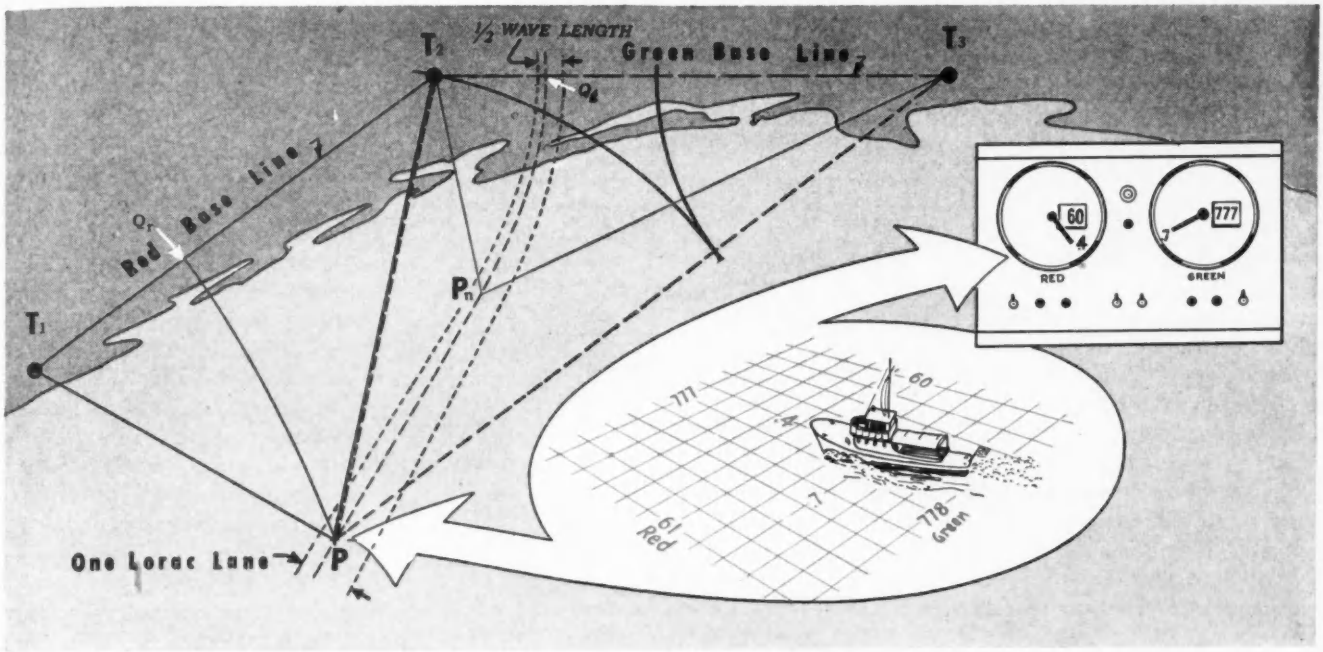
It should also be pointed out that once a certain filter setting has been established, it should never be changed on a given prospect. Different filters may produce errors in reflection times due to frequency changes. Any factor for adjustment of filter is strictly taboo. In general, a narrow band filter setting which peaks at approximately 60 cycles per second is preferred.

"On location" shooting is a must in Kansas. To obtain the greatest accuracy, it is desirable to have the shot hole and geophones placed on similar surface at equal elevation. For instance, when the geophones are placed on a road bed and the shot hole is in the borrow ditch or in the field across the fence, no one knows or can calculate the milliseconds of error involved.

However, the erosional anomalies and "Karst" topography that exists on and adjacent to the Central Kansas Uplift (Figure 1) make the location of shot holes over potential drill sites most advisable. This procedure becomes a "must" when testing Pre-Pennsylvanian strata with the drill. Kansas oil men are constantly in danger and fearful that a well drilled on a good subsurface "high" will drop into a drainage channel or sink hole. The seismologist, when placing his shot point on location, has a much better chance of finding this "low" than when his shot hole is 330 feet away, out on the road or down the half-line. The methods he uses to locate these sink holes will be discussed later. "On location" shooting is more desirable than road shooting for any type of subsurface structure in Kansas, since a great many of the oil pools are small and it is necessary to go inside of sections or quarter sections to find them. Kansas pools are not textbook examples, it is very difficult to predict by subsurface methods whether the next location will be high or low. For this reason and the fact that dips are rapid, shot points must be located precisely on "drillable" locations.

When a seismologist outlines the shooting profiles for a prospect, he endeavors, when possible, to tie into all drilled well data. This enables him to better determine from his records which reflections are bona fide, which are giving him the answer, and which ones are the most dependable. It enables him to be sure he can answer the geologic problems at hand.

Evaluating Offsets. The seismic evaluation of a property offsetting existing production does not necessarily require that structural closure be established. It is usually sufficient to know the structural relationship with reference to the offset oil well. However, in the areas where established closure is necessary, it is the seismologist's duty to obtain sufficient seismic control before submitting a drilling recommendation. He should also be constantly aware that well tops (old wells especially) may be inaccurate. For instance, one of the main markers in Kansas is the top of the Lansing formation. Although standardized at the present time, the actual top has been disputed for many years. The mis-correlated tops are approximately 20 feet apart. This is the difference between the brown lime and the white lime, and is very often the reason seismic data does not tie geologic data. In any event the



LORAC---
its purpose and principle

The purpose of Lorac is to provide an accurate and convenient means of establishing position. A position not dependent on visibility, or on the use of short-range, *high-frequency* radio waves.

The basic principle of Lorac is the determination of the position at a point P with respect to three low frequency radio transmitters.

This is accomplished by phase-meters which indicate indirectly the *difference in distance* between the point P and two fixed land-base transmitters such as T_1 and T_2, or T_2 and T_3.

With only two transmitters there are a series of points whose *difference in distance* to the transmitters is the same. This series of points (P, P_n, etc.) lie on a hyperbolic curve.

Therefore to obtain a fix at point P, three transmitters are required providing two hyperbolas whose intersection locates the exact point in question.

The Lorac phase-meters indicate position to 1/100 part of the spacing between two hyperbolic lines called "lanes" which are separated on the base-line by a distance equal to ½ the wave length of the transmitted continuous-wave signals.

Thus an accuracy of *plus or minus 2.5* feet is possible on the base-line between the transmitters of the Gulf Coast Lorac networks.*

This accuracy decreases somewhat out to sea due to the lane expansion. However, for distances up to 100 miles off-shore, the positioning accuracy of Lorac is more than sufficient for all types of geophysical operations.

* Three networks in operation covering an area from off the Coast of Freeport, Texas, to Caillou Bay, Louisiana.

LORAC SSC

Lorac Service Corporation
A SUBSIDIARY OF SEISMOGRAPH SERVICE CORPORATION
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seismologist should not force his data to tie well tops by applying a velocity gradient factor of any kind unless it is definitely known. Moreover, it is the duty of the oil operator to furnish the best available well tops in the area of the seismic prospect.

The "inside" geophones are used for computed times. It is thus extremely important that these phones are planted correctly and at a precise distance from the shot hole. To have complete control of the "weathering" problem at the shot hole, it is desirable to have four sets of geophones around the shot hole rather than two. This is best accomplished by placing them in a "diamond" pattern each exactly 55 feet from the shot hole and as nearly as possible at the same elevation as is the shot point. The figure 55 feet has been established by experimentation as the nearest distance free from hole noise. This is also a desirable distance for computation methods which utilize the first arrival times.

The Surface Sand Problem and the Isotime:

As may be noticed by glancing at the geologic map of Kansas, a great portion of the state is mantled by loosely consolidated Tertiary and Quaternary deposits of sand, sandy clay and gravel. The base of these sediments is generally in contact with Cretaceous or Permian beds. The top of this "bedrock" often varies considerably in relief. The important consideration to the seismologist is the resultant errors caused by the difference in velocity between the two zones. The velocity of the upper material (Tertiary and Quaternary) is 5500 to 6000 feet per second, and that of the lower material (Cretaceous and Permian) is 7000 to 8000 feet per second. In general, dynamite charges placed somewhere within this Tertiary or Quaternary mantle result in exceptionally good record quality. When this mantle is thin, it is always important to have a shot below it for velocity control. This, of course, will answer the surface sand problem, but there is an optimum depth where the cost of drilling for this information exceeds the desirability of obtaining it. Here is where the Anhydrite reflection plays its important part. The Anhydrite, or Stone Corral Dolomite, in Kansas is a relatively thin bed which produces a very good reflection (See Figure 2). The Anhydrite

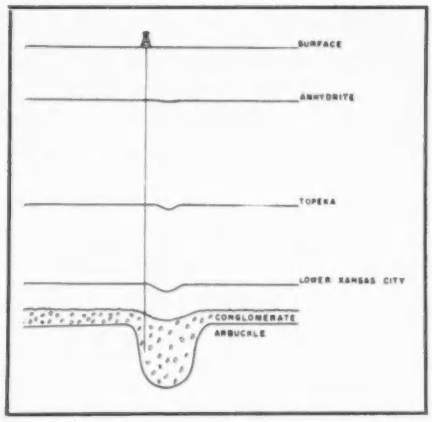

Fig. 3—Reflection from "Lower Kansas City" accurately reveals structure of top of eroded Arbuckle and upper reflections show it to lesser degree. Conglomerate of Pennsylvanian age rests unconformably on Arbuckle in Central Kansas Uplift area, filling Arbuckle channels and sink holes. But because of differential compaction, there is a "draping" effect, which causes top of Conglomerate and overlying beds to be slightly lower over top of sink hole.

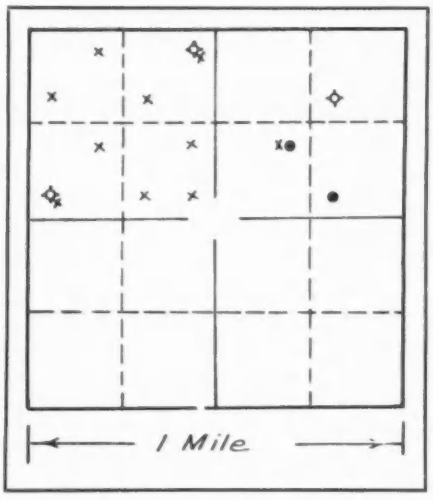

Fig. 4—Shooting pattern shown by x's, with two x's or shot points per 40 acres, probably would satisfactorily evaluate the northwest quarter of this section, which has two dry holes on it. One of dry holes had good oil show; the acreage being ¼ mile west of good production in small pool area. There are many small tracts similar to this example in Central Kansas, and seismograph has been very successful in evaluating them.

does vary in relief but the seismologist can usually depend on it to be relatively flat, thus "isotime" or time isopachous maps can be made between the Anhydrite and lower reflecting beds with a great deal of assurance that the thinning encountered is the result of structure on the lower beds. The Anhydrite reflection is thus very important, and by proper instrumentation and by shortening cable spreads to say 330 feet, this reflection may be recorded and identified when it is as shallow as 400 to 600 feet below the surface. It is often more desirable to obtain the Anhydrite reflection by shortening spread length, which necessitates jump correlation shooting, than it is to have actual continuity between shot points.

"Isotime" maps involving any two reflecting beds are very important in most parts of Kansas for the verification of structure, which is determined from normal depth computations. They should never be disregarded, and are generally used in conjunction with the structural maps.

The Salt Problem and the Isotime:

Below the Anhydrite in a great portion of Kansas lies the Wellington salt. For various reasons this salt varies greatly in thickness in some local areas. Because of the great velocity differential between the salt and the adjacent shales, errors in the magnitude of 25 to 50 feet may result in the use of conventional methods of computation. In addition to this, some slumping of the Anhydrite exists over some of these thin salt sections, and although such a condition should result in a partial cancellation of errors, the problem still is critical, and very little is known of the problem from a seismic standpoint. Since the travel paths of seismic waves must pass through this salt zone, down and back to the Anhydrite, it is apparent that the isotime map involving the Anhydrite may be in error.

It thus becomes necessary to construct time interval maps between two reflections, both of which are emanating from below the base of the salt. It is very often possible to use a Lower Permian reflection as the upper bed for the isotime map, or if this is not present, the well known "Topeka" reflection can be used.

As to accuracy, when all known ways of eliminating errors are utilized, and when record quality is at its best, it can be concluded that the answer is generally on the records. When the records are shot properly, it soon becomes apparent to the seismologist that changes in record "character" have a geologic significance which must be applied to the problem of finding oil.

Depending on the area, the following reflecting beds may be mapped in

BJ MEANS ENGINEERED OIL TOOLS

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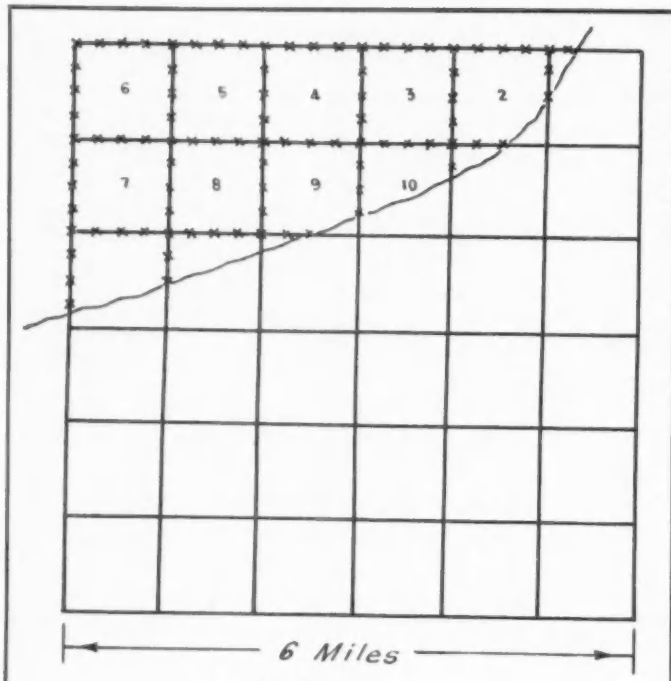
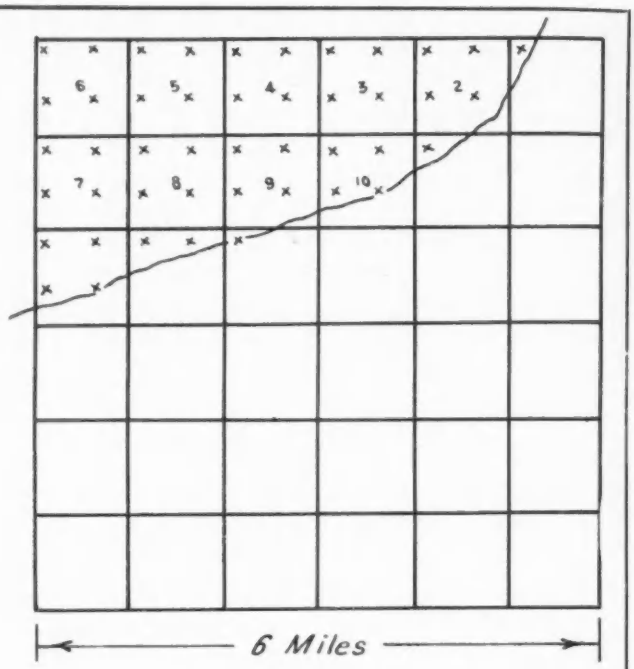


METHOD 1
Figure 5



METHOD 2
Figure 6

THE OLD AND NEW METHODS for shooting a large block of wildcat acreage in Western Kansas, covering many sections. The old method is to run lines down road in a one-mile grid pattern as shown in Figure 5. In one township this would amount to 350 shot points counting common ties at section corners. As no control is obtained inside the sections, this is actually reconnaissance work. The prospect should be platted as in Figure 6, on a half-mile jump correlation pattern, with one shot point on location, as an example, in the northwest corner of every quarter section. Such a pattern would involve 169 shot points per township and they actually afford more control for geologic contouring than the 350 shot points of Figure 5.

Kansas: Anhydrite, Topeka, Lansing, Lower Kansas City, Mississippian and Ordovician. Figure 2 shows a typical seismograph record in Kansas.

The Arbuckle. The most important question the oil man of Kansas asks is, "Can the top of the eroded Arbuckle be mapped?" This, at the present time, is practically an impossibility. However, the seismologist is constantly trying to do this very thing. In the area of the Central Kansas Uplift, the Anhydrite, Topeka, Lower Kansas City and Pre-Pennsylvanian strata are the mappable horizons. The Pre-Pennsylvanian reflection, although probably coming from a bedding plane within the Arbuckle, should not be labeled "Arbuckle." If so labeled, it will be referred to by geologists and oil men as representing the top of the eroded Arbuckle, and as such will not tie well data properly. It must be recognized as a bedding plane only, and although showing true structural conditions, will not answer the local erosional problems.

The best answer to this problem is a reflection which very often is present on the records and exists immediately above the top of the Conglomerate. The Conglomerate is considered Pennsylvanian in age and rests unconformably on the Arbuckle surface in that area defined as the Central Kansas Uplift. It fills the Arbuckle channels and sink holes. However, because of differential compaction, there is usually a slight "draping" effect which causes the top of the Conglomerate and the overlying beds to be slightly lower over the top of this sink hole. The reflection referred to, generally labeled "Lower Kansas City," usually shows this "draping" effect best, although upper reflections will show it to a lesser degree. An important reason for the occasional masking of this effect in the upper beds is shown in Figure 3.

Here the seismic data was right and all formations ran normal until the drill encountered a long Conglomerate section and failed to reach Arbuckle. Had the shot point been possibly one or two hundred feet away (to the right on the diagram), the hole would not have been drilled. This unfortunate situation happens to the seismologist occasionally and at the present time, no inexpensive protection is available for him or the oil operator.

When an oil man inquires about an area he wishes to shoot, the seismologist must go over in detail the known geologic problems encountered in the area. Different problems exist from one small area to the next and it is very important that the geologic problems of each prospect be studied thoroughly. The "layout" of the prospect should require a good deal of discussion in order to conserve points and to be sure that some critical point is not omitted. As a typical example, refer to Figure 4. Assume the oil operator has a quarter section he wishes to evaluate completely. It has two dry holes on it now, one of which had a good oil show, and his acreage is one-fourth mile from good production in a small pool area. The suggested shooting pattern in this case would be as shown by "x's" in Figure 4, with two "x's" or shot points per 40 acres, on location, a tie to both dry holes in his quarter, and a direct tie to production. (The well ties should be within

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60 feet of the actual location.) This amount of shooting will evaluate his lease. If good, it may be necessary to obtain a few more control points before or after his first well is drilled. In this particular example it is not necessary to establish closure; only the relationship to production is necessary. There are innumerable small tracts of acreage in central Kansas in this category. Seismograph has been very successful in accurately evaluating such acreage.

Laying Out Lines. It is well to emphasize the drastic changes made by seismologists in the past few years on the method of laying out lines. Continuing with the example mentioned in the preceding paragraph, the old-fashioned method would have been to shoot a line around the quarter section, then cut it in the middle. This would require 12 instead of 10 points and the centers of the 40-acre tracts still would not be evaluated.

When evaluating acreage as in Figure 4, the lines, when shot continuous, must of course zig-zag from shot point to shot point across the acreage. This is entirely acceptable in most areas of Kansas, although there are some areas where lines must be in a straight line. For example, such is the case in the area of the Geneseo pool in southern Ellsworth and northern Rice counties where dips must be migrated and faulting is suspected.

As another typical example, consider Western Kansas (the area west of the Central Kansas Uplift) where seismograph recently has been quite successful. Consider the oil man having a block of wildcat acreage covering many sections. The old method is to run lines down the road in a one-mile grid pattern as shown in Figure 5. In one township this would amount to 350 shot points counting common ties at section corners. Since no control is obtained inside sections, this is actually reconnaissance work. Rather than do this, the prospect should be platted as in Figure 6, on a half-mile jump correlation pattern with one shot point on location, as an example, in the northwest corner of every quarter section. Such a pattern would involve 169 shot points per township. From this survey, the oil man usually can expect maps representing the Anhydrite, Pennsylvanian and Pre-Pennsylvanian strata. These 169 shot points actually afford more control for geologic contouring than the 350 shot points demonstrated by the pattern in Figure 5. These maps will miss very few anomalies in Western Kansas. The positive features thus discovered should then be detailed by additional, and possibly continuous, seismic control to determine the highest seismic point. This is very important in any type of reconnaissance shooting in Kansas. A closing contour looks good to the oil operator, and his first reaction is to drill in the center. However, when he comes back to the seismologist complaining of a dry hole, it is too late to tell him that he needed a few more shot points. Actually, his dry hole may have just missed an oil field by a location or two. Moreover, by determining and drilling the best location, the structure has thus been completely tested with one dry hole. No reconnaissance work in Kansas should be spaced wider than one-half mile or oil fields will be overlooked.

Seismograph work is costly, and it is extremely important that the seismologist save the oil operator every shot point he can. For this reason, if the oil operator can afford the time, it is a money-saving venture on his part to shoot one line across his suspected "high," then let his seismologist evaluate it. If the "high" does not exist, he may forget it. If it does exist, he may then run the next and possibly last line perpendicular to and crossing the highest point on the axis. This method, which only the "hot-shot" crew can practice, will save the operator nearly one-half of his shooting cost.

The oil man is always in a hurry. It is the seismologist's problem to get the assignment completed when the oil man wants it. With crews set up as they are today, this is generally possible. However, the oil man should give his seismologist as much advance notice of the shooting job as possible so he will have ample time to work it conveniently into his schedule, and ample time to interpret the results properly.

After the prospect is completed, the oil operator can expect the seismologist to enter into a thorough discussion of the results. Acquisition of additional acreage will be recommended on leads discovered by the shooting. Knowing the oil operator's problems, actual drill sites will be recommended for drilling and other locations condemned. The oil operator can expect the seismologist to view the prospective drill site as if he, the seismologist, were spending his own money. He can expect the seismologist to follow the recommended location with interest as the well is being drilled, and to discuss the results thoroughly, utilizing the new information obtained by the drilling of the well. He can expect help on his drilling program if he so desires, long after the prospect has been finaled.

In summary, seismic problems in Kansas are being solved and, although much is yet to be learned and desired, seismograph can take credit for finding innumerable new oil pools in recent years. It has quite accurately aided in the decision whether or not a specific location should be drilled. There is no reason why seismograph cannot become even more successful if complete cooperation between the oil man and his seismologist is maintained.

—The End.

About the Author

ROBERT H. GLOVER was graduated from the University of Nebraska with a B.A. in geology in 1941. After a year of graduate work he joined the exploration department of Superior Oil Company in California. He left Superior in 1947 to help form Central Exploration Company in Oklahoma City. In 1950 Glover opened Central's branch office in Wichita, Kansas. He is a member of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists and the Kansas Geological Society.

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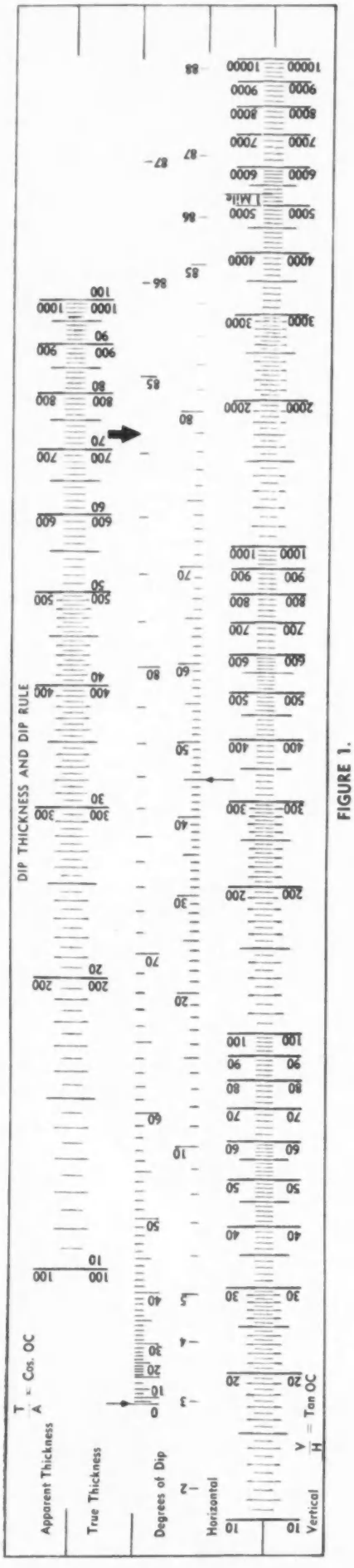

FIGURE 1.

Subsurface Problems Are Easier to Solve

. . . . with this slide rule. Here's a real time-saver and instructions on how to make it.

By B. OSBORNE PRESCOTT, Geologist
Shell Oil Company, Oklahoma City, Okla.

MANY NOMOGRAMS, charts and tables have been developed as tools for solving problems caused by steeply dipping beds in the subsurface. It is believed, however, that the slide rule is the most effective tool for this purpose, and here's one designed to solve two of the principal problems:

- Thickness exaggeration due to dip
- Differential elevation due to dip

These solutions may be achieved with any standard slide rule, but the procedure is greatly simplified by proper selection and grouping of scales in a specially designed rule.

Construction. The slide rule shown in Figure 1 can be enlarged by photostat or other reproduction process[1] to 16 inches long and mounted on a slide rule blank constructed as follows:[2]

Referring to Figure 2, all pieces of the blank, except the shims, are made of heavy (14 ply) poster board.

1. Cut three pieces the size of the slide rule (Figure 1).
2. The first of the above pieces is the base of the blank, Part (1) in Figure 2.
3. The second of the above is cut into five (5) equal widths; these are parts 2, 3, 4, 5 and 6 in Figure 2.
4. The third of the above is cut as follows:
   a. Parts 8 and 10 are ¼-inch wider than the parts in Step 3.
   b. Part 9 is ¼-inch narrower than the parts in Step 3.
   c. Parts 7 and 11 are ⅛-inch narrower than the parts in Step 3.
5. Using a good grade of cellulose cement, cement 7 to 1 with edges flush and straight. Let dry under weight.
6. Place 8 in position and leave enough room for slipping, as this is the base of one of the slides. Mark on 1 along the edge of 8 nearest to 9, and remove 8.
7. Cement 9 to 1 on line marked in Step 6. Let dry under weight.
8. Repeat Steps 6 and 7 to mount 11 in position.
9. Cut out of heavy drawing paper five pieces equal in dimensions to parts 3, 5, 7, 9 and 11. These are shims to give freedom of movement to the slides.
10. Mount the corresponding paper shims on parts 7, 9 and 11 and on the under side of parts 3 and 5. Let parts dry under weights.
11. Cement 2 to 7 and let dry under weight.
12. Place 8 in its groove and mark a line along the edge of 2 on 8 and remove 8.
13. Cement 3 to 8 with paper shim toward 8 on the line marked in Step 12. Let dry under weight.
14. Slide 8 and 3 into position and cement 4 to 9; then *carefully* slide 8 and 3 out so they will not stick to the center support 4 and 9. Let dry under weight.
15. Repeat Steps 12, 13 and 14 to mount parts 5 and 6.
16. Before Cutting out Figure 1 cover the back of the figure with "dry mount tissue."
17. Carefully cut out with a paper cutter the parts of Figure 1 and mount them on the slide rule you have prepared.

To insure the accuracy of the rule,

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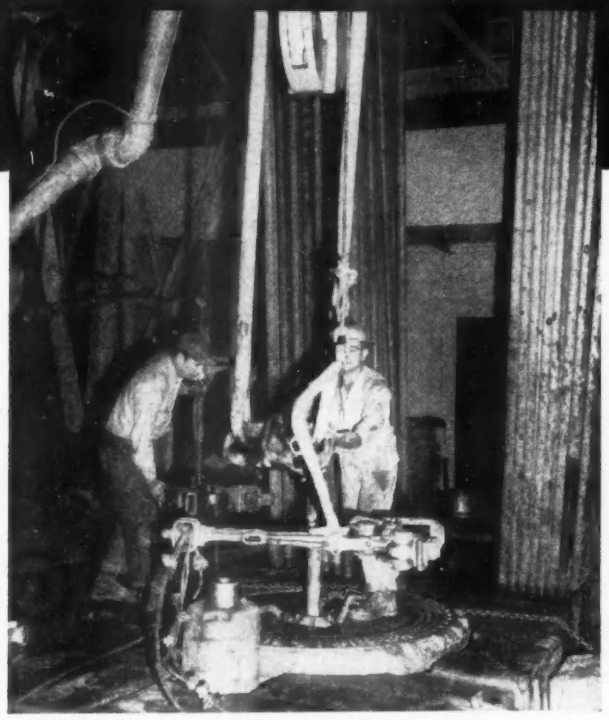

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mount the scales in the following order:

1. The top scale called "apparent thickness" is mounted flush to the inner or slide edge.
2. With the slide 3 and 8 in the center of the rule, mount the second scale called "true thickness" so its scale is in unison with that of the "apparent thickness" scale.
3. The "degrees of dip" scale is now mounted so that the left-hand or black index is opposite 0° when the two upper scales are in unison.
4. Mount the next scale called "horizontal" in the center of slides 5 and 10.
5. The "vertical" scale is now mounted so that it is in unison with the "horizontal" scale when the index arrow is set at 45°.

The dry mount tissue may be purchased at any photographic store and the heat necessary to mount the rule is supplied by an iron set on medium heat. Be sure to protect the printing by placing a piece of bond or tracing paper over the printed surface before ironing the scales on to the rule.

The final product is protected by spraying with plastic.

Operation. The slide rule consists of two separate rules constructed, for convenience, as a unit. The upper rule is used in solving thickness exaggeration problems, and the lower rule in solving differential elevation problems.

On the upper or "dip-thickness rule" there are two logarithmic scales labeled in black in hundreds of feet from 100 to 1000. The topmost scale is the "apparent thickness" scale (A in the formula). The second scale is the "true thickness" scale (T in the formula). There is an additional set of red[3] labels (10-100) on the "true thickness" scale. Below and near the ends of the latter there are two index arrows. The black, left-hand, index arrow is used in conjunction with the black labels on the second scale, and the red,[3] right-hand, index arrow with the red labels. These index arrows point toward the "degrees of dip" scale (0 in the formula). This last is a logarithmic cosine scale.

In use, values of true thickness in black or red, and apparent thickness occur opposite each other when the corresponding black or red index arrow is opposite the degree of dip.

Example I: Given: A = 600 feet
T = 300 feet
To Find: α

Procedure: Set 300 on the true thickness scale opposite 600 on the apparent thickness scale. Opposite the black arrow read the answer: 60°.

Example II: Given: α = 75°
A = 250 feet
To find: T

Procedure: Inasmuch as the A and T scales are out of alignment when the black index is set on 75°, the red index must be used. Therefore, set the red index arrow opposite 75° on the degrees of dip scale. Then opposite 250 on the apparent thickness scale read the red figures for the answer: Approximately 65 feet.

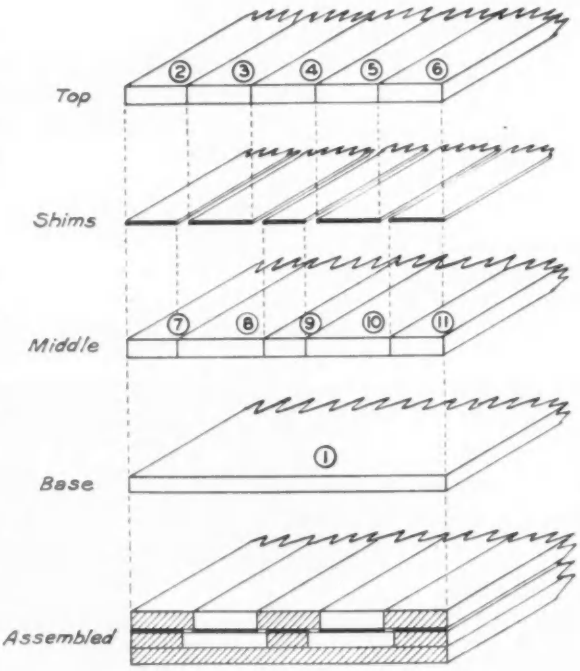

FIGURE 2. End view showing construction of blank.

To solve for thickness values other than those marked on the rule, the decimal point is moved in the same direction and the same amount on each thickness scale. In Example I, the same answer is derived from A = 6 feet, T = 3 feet, or A = 6000 feet, T = 3000 feet. In Example II, if A = 25 feet, then T = 6.5 feet, or if A = 2500 feet, then T = 650 feet.

On the lower or "dip rule" there are two logarithmic scales labeled from 10-10,000 feet. The lowermost scale is the "vertical difference" scale (V in the formula). The next scale above is the "horizontal distance" scale (H in the formula). About midway the length of the rule and above the second scale is an index arrow. Above this is the "degrees of dip" scale (α in the formula). This last is a logarithmic tangent scale.

In use, the same procedure is followed as with the "dip-thickness rule."

Example III: Given: H = 550 feet
V = 200 feet
To find: α

Procedure: Set 550 on the horizontal distance scale opposite 200 on the vertical difference scale. Opposite the index arrow read the answer: 20°.

Example IV: What is the fall in feet per mile for a 9° dip?

Procedure: Set the index arrow at 9°. Opposite the "1 mile" mark on the horizontal distance scale read the answer: Approximately 830 feet.

Example V: What is the distance between 500-foot contours for a dip of 14°?

Procedure: Set the index arrow at 14°. Opposite 500 on the vertical difference scale read the answer: Approximately 2000 feet.

—The End

REFERENCES

[1] Owing to the limitations of reproduction the rule is shown in a reduced size. If a base is constructed this is of no consequence. If, however, a wooden base is purchased, this figure must be enlarged to fit.

[2] Wooden slide rule blanks may be purchased and the described construction, Steps 1 to 15 inclusive, eliminated.

[3] These are shown in black in the illustration and should be colored on the final product.

ACKNOWLEDGMENT

The writer thanks the Shell Oil Company for permission to publish this article.

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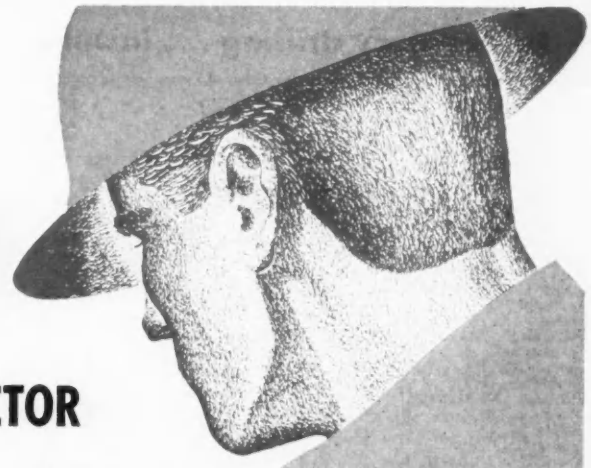

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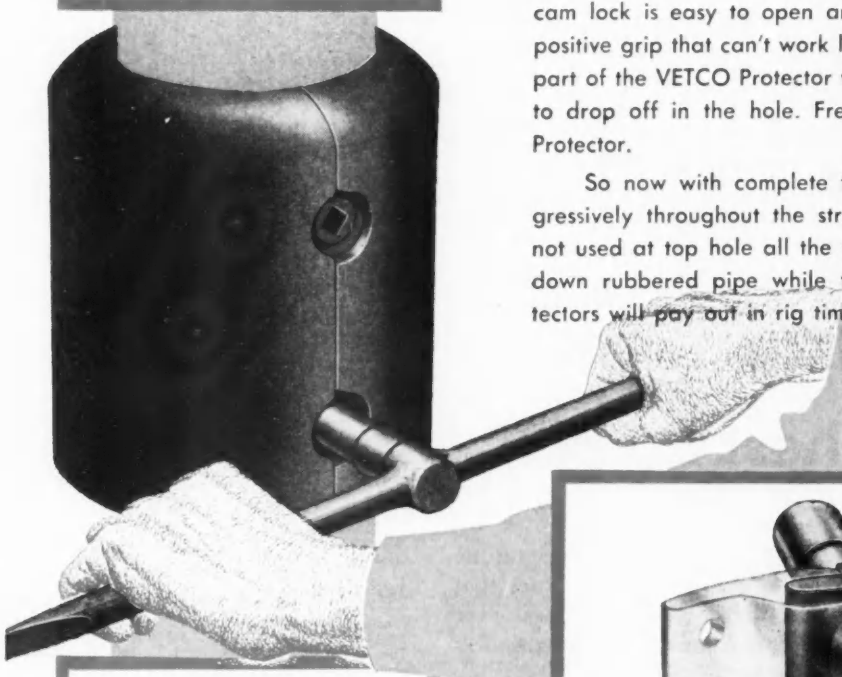

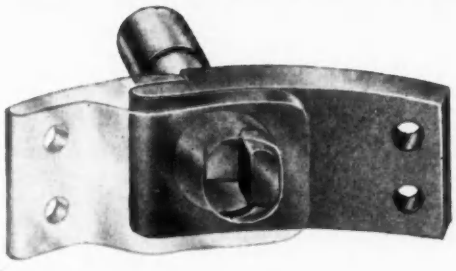

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State or District	MONTH OF JULY, 1953													FIRST SEVEN MONTHS, 1953															
	Productive Tests									Total Productive	Unproductive Tests			Total Exploratory Tests	Productive Tests								Total Productive		Unproductive Tests			Total Dry		Total Exploratory Tests	
	New Fields			New Pays			Extensions								New Fields			New Pays			Extensions									
	Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas		Wildcats	New Pays	Outposts		Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas	7 Mo. 1953	7 Mo. 1952	Wildcats	New Pays	Outposts	7 Mo. 1953	7 Mo. 1952	7 Mo. 1953	7 Mo. 1952
Alabama											9			9										2	44			44	21	44	23
Arizona											1			1											6			6	1	6	1
Arkansas	3			1						4	18			22	8		1	10						19	11	70			70	51	89	62
California				4		1				5	30		2	37	11		3	15		4	13		1	47	58	243		24	267	220	314	278
Colorado	2									2	30			32	13	1	9			1	2			26	18	167			167	98	193	116
Florida											2			2												20			20	6	20	6
Georgia																										3			3		3	
Idaho											2			2												4			4		4	
Illinois	2			1			9			12	44			56	10			10			26			46	51	248			248	311	294	362
Indiana	3		1				1			5	49			54	18		2	1		1	5			27	21	201			201	202	228	223
Kansas	7		1							8	63			71	81		15	3			3			102	88	512			512	508	614	596
Kentucky	1									1	14			15	13		1				2			16	20	64			64	69	80	89
Louisiana	6	2		2		2				12	31		1	44	18	11	1	25	7	5	7	4	1	79	58	207		4	211	200	290	258
North Louisiana	1	2								3	19		1	23	3	4		4	1		4			16	26	102		3	105	103	121	129
South Louisiana	5			2		2				9	12			21	15	7	1	21	6	5	3	4	1	63	32	105		1	106	97	169	129
Michigan			1				1			2	26			28	6			4			4			14	26	133			133	142	147	168
Mississippi	1	1		1			1			4	20		2	26	6	2	2	4	1		2	1		18	15	117		5	122	95	140	110
Missouri											1			1												8			8	14	8	14
Montana	3		1							4	13			17	6		2				1			9	5	51			51	29	60	34
Nebraska	1		1							2	13		1	16	13		2				2		1	18	7	88		1	89	52	107	59
Nevada											1			1												7			7		7	
New Mexico	2		2							4	16			20	12		11	1			4		2	30	40	80			80	70	110	110
North Dakota	2									2	10			12	6						2			8	8	30			30	4	38	12
Ohio							1			1				1							2		1	3	9	10			10	21	13	30
Oklahoma	8	2		1			6		2	19	50			69	62	6	14	19		1	38	1	5	146	113	413			413	416	559	529
Pennsylvania																							1	1						2	1	2
South Dakota											3			3												8			8	2	8	2
Texas	45	7	9	27	7	1	16	2	2	116	354		9	479	297	45	58	148	26	16	85	14	13	702	599	2413		67	2480	2437	3182	3036
Dist. 1 S. Central	2		1		1					4	23		2	29	8	2	3	1	2		1	1		18	17	187		7	194	183	212	200
Dist. 2 Middle Gulf	1			1	1		2			5	18		2	25	11	7	6	7	3	1	3	1	2	41	56	160		4	164	167	205	223
Dist. 3 Upper Gulf	4	4	1	8	1	1	1	1		21	31		4	56	17	9	4	31	11	7	8	8	5	100	81	210		40	250	193	350	274
Dist. 4 L.Gulf-S.W.	1	3	1	9	3			1		18	46			64	24	17	22	36	9	7	2	2	3	122	64	267		3	270	258	392	322
Dist. 5 E. Central											5			5	3	1	1	2						7	4	74			74	67	81	71
Dist. 6 Northeast	1									1	19			20	4	3		4						11	17	83			83	80	94	97
Dist. 7-B N. Cent.	15		4	4			4		1	28	81			109	98		15	24			17	1	1	156	122	554		1	555	571	711	693
Dist. 7-C W. Cent.	7			1			1			9	23			32	37	5	3	13			5			63	62	198		2	200	236	263	298
Dist. 8 West	5			2	1					8	42			50	42	1	1	9	1		18			72	77	212		2	214	234	286	311
Dist. 9 North	9		2	2			8		1	22	65		1	88	52		3	21		1	30	1	2	110	98	466		8	474	427	584	525
Dist. 10 Panhandle											1			1	1						1			2	1	2			2	21	4	22
Utah			3							3	4			7	3		4				1			8		29			29	27	37	27
West Virginia																									1				3		4
Wyoming	4			1						5	15			20	13			3						16	13	67			67	61	83	74
Total U. S.	90	12	19	38	7	4	35	2	4	211	819		15	1045	596	65	129	239	34	28	199	20	25	1335	1163	5243		101	5344	5062	6679	6225

Exploratory Well Completions Reach Year's Highest Point

THE 1045 exploratory well completions recorded in July shaded the 1033 completed the previous month to reach a new high point for the year. Not only were they the year's highest, but July's wells numbered the second greatest ever credited to a single month. The all-time high mark was the 1082 total completed in October of last year.

The month's high activity continued the stepped-up drilling rates that have characterized this year's exploration campaign. At the end of seven months, total tests completed amounted to 6679, which was an increase of 7.3 percent over the 6225 drilled in the same period of 1952. Further emphasizing the magnitude of current operations is the fact that 1952's activity was the highest ever attained by the industry prior to this year.

Not only were July's tests numerous, but a slightly better than average number were completed as producers. A total of 211 successful wells was the result of the period's activity, and it amounted to 20.2 percent of the total drilled. A month earlier, the score was slightly higher, being 21.3 percent, but the average for the year to date was only 20.0 percent. That itself is a pretty fair average, and the best the industry's drillers could do in the same period of last year was to find commercial production in 18.7 percent of the holes drilled.

July's efforts were rewarded with 128 new oil pools. Those were made up of 90 new oil fields and 38 new pay horizons in established fields.

Summary of Results of Exploratory Drilling

ITEM	July, 1953	June, 1953	SEVEN MONTHS January-July 1953	1952	Percent Diff.
Oil Discoveries	**128**	**138**	**835**	**757**	**+ 10.3**
New Fields	90	100	596	576	+ 3.5
New Pays	38	38	239	181	+ 32.0
Distillate Discoveries	**19**	**16**	**99**	**78**	**+ 26.9**
New Fields	12	11	65	69	— 5.8
New Pays	7	5	34	9	+277.8
Gas Discoveries	**23**	**21**	**157**	**114**	**+ 37.7**
New Fields	19	19	129	91	+ 41.8
New Pays	4	2	28	23	+ 21.7
Total Discoveries	**170**	**175**	**1091**	**949**	**+ 15.0**
Extensions to Fields	**41**	**45**	**244**	**214**	**+ 14.0**
Oil Fields	35	34	199	178	+ 11.8
Distillate Fields	2	7	20	6	+233.3
Gas Fields	4	4	25	30	— 16.7
Total Prod. Tests	**211**	**220**	**1335**	**1163**	**+ 14.8**
Dry Holes	**834**	**813**	**5344**	**5062**	**+ 5.6**
Wildcats	819	798	5243	4863	+ 7.8
New Pays				11	—100.0
Outposts	15	15	101	188	— 46.3
Total Expl'tory Tests	**1045**	**1033**	**6679**	**6225**	**+ 7.3**
Percent Productive	20.2	21.3	20.0	18.7	
Percent Dry	79.8	78.7	80.0	81.3	

U. S. Discoveries in July

NEW FIELDS, NEW PAYS AND EXTENSIONS

ARKANSAS—NEW OIL FIELDS

Columbia County. Murphy Corp.'s Birtie 1, C SW NE 6-19s-18w, flowed 72 barrels from Cotton Valley sand, Jurassic 7588-98 feet, 12/64-inch, 42-gravity, completed 7-29-53, TD 8777.

Lafayette County, Lewisville, North field. Burnett Production Co.'s Allie Boyette A-1, C SE NE SE 33-15s-24w, pumped 20 barrels oil and 17 barrels water from Tokio sand, Upper Cretaceous 2808-12 feet, 22-gravity, completed 7-15-53, TD 5224.

Union County, North Mt. Holly area. Murphy Corp.'s Woodward 1, C SW NE 22-16s-18w, pumped 40 barrels oil and 90 barrels water from Travis Peak sand, Lower Cretaceous 4445-47 feet, 39-gravity, completed 7-28-53, TD 6936.

ARKANSAS—NEW OIL PAY

Union County, Champagnolle field. Curtis Kinard's J. W. Taylor B-1, in 10-17s-14w, Old Well Drilled Deeper, flowed 55 barrels from Cotton Valley sand, Jurassic 4134-40 feet, 12/64-inch, 32.5-gravity, completed 6-28-53, TD 4350.

CALIFORNIA—NEW OIL PAYS

Kern County, Lost Hills field. Standard Oil Co.'s "Well" 16, NW SW 29-26s-21e, pumped 177 barrels from Carneros sand, Miocene 6022-49 feet, 32-gravity, completed 7-2-53, TD 8200.

McDonald Anticline field. Ferguson & Bosworth's Layman 13, SE SE 18-28s-20e, Old Well Drilled Deeper, flowed 270 barrels from 2509-79 feet, 12/64-inch, 42.4-gravity, completed 7-3-53, TD 3580.

Los Angeles County, Long Beach field. Victory Oil Co., Operations Account's Wardlow 1, in 18-4s-12w, Old Well Worked Over, pumped 40 barrels from 6655-7320 and 6510-90 feet, 31-gravity, completed 7-3-53, TD 7448.

Ventura County, Oxnard field. Standard Oil Co. of California's McInnis 1, in 6-1n-21w, pumped 176 barrels from 6280-6370 feet, 22-gravity, completed 7-19-53, TD 9525.

CALIFORNIA—NEW GAS PAY

Glenn County, Beehive Bend Field. Sunray Oil Corp.'s Friesen 1, SE NW 19-19n-1w, flowed 6.0 million from 4497-4549 feet, completed 7-18-53, TD 5000.

COLORADO—NEW OIL FIELDS

Adams County. Pubco Development Corp.'s Schaffer 1, NE NE SW 15-8n-55w, pumped 37 barrels oil and 13 barrels water from "D" sand, Upper Cretaceous 5245-50 feet, completed 7-3-53, TD 5540.

Logan County. British American Oil Producing Co.'s Jorritsma 1, NE SW SE 12-11n-53w, flowed 485 barrels from "J" sand, Upper Cretaceous 5360-70 feet, ½-inch, completed 7-29-53, TD 5428.

ILLINOIS—NEW OIL FIELDS

Edwards County, Albion, West field. W. H. Sloan's P. Hortin 1, SW NW NW 10-3s-10e, pumped 27 barrels oil and 17 barrels water from McClosky lime, Mississippian 3373-78 feet, completed 7-14-53, TD 3420.

Macon County, Blackland field. Sun Oil Co.'s Damery 1, SW SW SW 5-15n-1e, pumped 11 barrels from Devonian lime, Devonian 1912-45 feet, completed 7-7-53, TD 3780.

ILLINOIS—NEW OIL PAY

Saline County, Eldorado field. H. E. Howard's C. Crawford 1, SW NW 8-8s-7e, pumped 226 barrels oil and 30 barrels water from Hardinsburg sand, Mississippian 2361-70 feet, completed 7-21-53, TD 3022.

ILLINOIS—OIL FIELD EXTENSIONS

Clay County, Clay City, West field. J. W. Steele's B. Leonard 1, SW SE NW 15-2n-7e, ⅝-mile south extension, pumped 71 barrels oil and 14 barrels water from McClosky lime, Mississippian 3079-84 feet, completed 7-7-53, TD 3085.

Sailor Springs, Consolidated field. Calvert Driling Inc.'s F. Berthold 1, NW NW NE 18-5n-7e, 1¼-mile extension, pumped 10 barrels oil and 240 barrels water from McClosky lime, Mississippian 2812-16 feet, completed 7-21-53, TD 2932.

Sailor Springs, Consolidated field. Shulman Bros.' Sol Ross 1, NW SE NE 28-3n-7e, ½-mile south extension, pumped 75 barrels from Rosiclare lime, Mississippian 2986-89 feet, completed 7-7-53, TD 2993.

Gallatin County, Ab Lake, West field. Lewis & Clemens' M. Abell 1, NE SW SW 30-8s-10e, ½-mile extension, pumped 65 barrels oil and 5 barrels water from Aux Vases sand, Mississippian 2748-62 feet, completed 7-21-53, TD 2945.

Hamilton County, Dale Consolidated field. J. D. Turner's Johns 1, NE SE SW 2-7s-5e, ¾-mile extension, pumped 35 barrels oil and 123 barrels water from Aux Vases sand, Mississippian 3230-40 feet, completed 7-7-53, TD 3240.

Jefferson County, Divide, West field. J. F. Dunhill's Tate-McDaniel Community 1, NE SW NE 27-1s-3e, ½-mile south extension, pumped 111 barrels from McClosky lime, Mississippian 2789-92 feet, completed 7-21-53, TD 2822.

Wayne County, Maple Grove, Consolidated field. Boling-Levine-Yabrove's P. Weber 1-A, in 24-1n-9e, 1-mile south extension, pumped 80 barrels oil and 75 barrels water from Aux Vases sand, Mississippian 3146-75 feet, completed 7-7-53, TD 3175.

Maple Grove, Consolidated field. Don Slape's A. Eichmann 1, SW NW SE 22-1n-9e, Old Well Worked Over, 1¾-mile extension, pumped 6 barrels oil and 80 barrels water from Aux Vases sand, Mississippian 3206-18 feet, completed 7-7-53, TD 3419.

White County, Concord South, Consolidated field. Felmont Oil Co.'s W. M. Ford et al 1, in 9-7s-10e, ½-mile extension pumped 5 barrels oil and 20 barrels water from McClosky lime, Mississippian 2950-54 feet, completed 7-14-53, TD 3056.

INDIANA—NEW OIL FIELDS

Daviess County. Graham Development Corp.'s Homer E. Capehart 2, SW SW NE 33-4n-7w, pumped 12 barrels from Rosiclare lime, Mississippian 1070-74 feet, TD 1075.

Gibson County. Miami Operating Co.'s Forman & Grace Knowles 1, NW NE NW 33-3s-12w, pumped 65 barrels oil and 15 barrels water from Waltersburg sand, Pennsylvanian 1903-10 feet, TD 1910.

Spencer County. Kentucky Oil & Mineral Development & C. Morburger's F. D. Stallings 1, NE NE SE 5-7s-6w, pumped 20 barrels oil and 20 barrels water from Aux Vases lime, Mississippian 1434-44 feet, TD 1446.

INDIANA—OIL FIELD EXTENSION

Gibson County, Patoka, North field. Wheeler Drilling Co.'s Anna Wolfe 2, in Mil. Don. 87-1s-10w, ½-mile extension, swabbed 240 barrels from Aux Vases lime, Mississippian 1789-92 feet, TD 1792.

INDIANA—NEW GAS FIELD

Greene County. Frank Lyons' Audrey Swaby 1, SW NE SW 25-8n-7w, ungauged from Devonian sand, 1690-95 feet, TD 1695.

KANSAS—NEW OIL FIELDS

Butler County. Rex & Morris' Marshall 1, NE SW SW 11-26s-7e, pumped 25 barrels from Mississippi dolomite, Mississippian 2755-58 feet, TD 2758.

Cowley County. Fred Ayesh's Beamer 1, SE SE NE 10-32s-7e, pumped 25 barrels from Layton sand, Pennsylvanian 2114-2200 feet, TD 3025.

Ellis County, Reichert field. Victor Drilling Co.'s Reichert 1, NW NW NE 9-15s-19w, pumped 11 barrels from Lansing-Kansas City lime, Pennsylvanian 3423-30 and 3440-50 feet, TD 3687.

Pratt County, Moore, Southwest field. H. L. Moore's Hoener 1, NE NE NW 26-26s-13w, pumped 290 barrels from Arbuckle lime, Ordovician 4358-76 feet, TD 4376.

Unnamed field. Helmerich & Payne's Hertlein 1, SE SE NW 22-28s-13w,

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Rainbo Service Co. - ME 4-2131, ME 4-4555
WICHITA FALLS
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DISCOVERIES . . .

pumped 77 barrels from Lansing-Kansas City lime, Pennsylvanian 3924-40 feet, TD 4665.

Stafford County, Wood field. Petroleum Inc.'s Wood 1, SE SE SW 33-24s-14w, pumped 26 barrels from Arbuckle lime, Ordovician 3967-68 feet, TD 4015.

Trego County. Lafayette Oil & Schaffer Drilling Co.'s Baugher 1, SW SW SE 21-12s-21w, pumped 120 barrels from Marmaton lime, Pennsylvanian 3874-84 feet, TD 3954.

KANSAS—NEW GAS FIELD

Morton County. J. M. Huber Corp.'s Church 1, SW SW NE 18-32s-40w, flowed 22.0 million from Morrow sand, Pennsylvanian 5400-62 feet, open, TD 5825.

KENTUCKY—NEW OIL FIELD

McLean County. R. E. Hupp-Syl Yunker & Pacific Operating's Sam Hoover Heirs 1, SW NE SW 25-0-26, pumped 55 barrels oil and 3 barrels water from Cypress sand, Mississippian 2002-15 feet, TD 2015.

NORTH LOUISIANA—NEW OIL FIELD

Claiborne Parish, Antioch, North field. Lyons, McCord & Logan's Robert Meadors 1, CW½ SW 8-22n-5w, flowed 201 barrels from Bodcaw sand, Jurassic 7762-74 feet, 24/64-inch, 37.2-gravity, completed 7-11-53, TD 7800.

NORTH LOUISIANA—NEW DISTILLATE FIELDS

Lincoln Parish. Southwest Gas Producing Company Inc. and Feazel Interest's Payne 1, in 10-19n-3w, flowed 5 barrels distillate and 0.1 million from McFearin sand, Jurassic 9674-84 feet, 8/64-inch, 58-gravity, completed 6-29-53, TD 9800.

Quachita Parish, Carlton field. W. C. Feazel et al's F. N. Wininger 1, in 11-18-1e, flowed 14 barrels distillate and 2.9 million from Bodcaw sand, Jurassic 9048-49 and 9052-64 feet, 21/64-inch, completed 7-31-53, TD 9620.

SOUTH LOUISIANA—NEW OIL FIELDS

Allen Parish. H. L. Hunt's Clyde Perkins 1, in 5-6s-7w, flowed 124 barrels from Cockfield sand, Eocene 8920-21 and 8923-27 feet, 8/64-inch, 46.7-gravity, completed 7-26-53, TD 10,500.

Beauregard Parish. Curtis Hankamer's Lutcher-Moore Lumber Co. 1, in 25-6s-13w, flowed 108 barrels from Cockfield sand, Eocene 7633-36 feet, 7/64-inch, 40-gravity, completed 7-20-53, TD 8600.

Unnamed field. J. M. Flaitz, R. B. Mitchell & M. L. Mayfield's Newport Industries 1, in 13-5s-11w, flowed 96 barrels from 7490-94 feet, 6/64-inch, 46.5-gravity, completed 7-6-53, TD 8004.

Plaquemines County, West Delta area. Continental Oil Co.'s State Lease 978-1, Block 53, flowed 173 barrels from 6370-80 feet, 9/64-inch, 26.4-gravity, completed 7-15-53, TD 13,034.

Unnamed field. Kerr-McGee Oil Industries, Inc.'s State Lease 1997-A-1, Block 20, Breton Sound, flowed 312 barrels from 5864-89 feet, 11/64-inch, completed 7-6-53, TD 8538.

SOUTH LOUISIANA—NEW OIL PAYS

Plaquemines County, South Pass-Block 24 field. The California Co.'s Louisiana State 1922-1, flowed 378 barrels from 8513-40 feet, 11/64-inch, 31-8-gravity, completed 7-20-53, TD 8646.

Terrebonne Parish, Orange Grove field. Ted Weiner's Wylie 3, in 84-17s-16e, flowed 227 barrels from 9651-53 feet, 10/64-inch, 35.5-gravity, completed 7-22-53, TD 13,115.

SOUTH LOUISIANA—NEW GAS PAYS

Cameron Parish, Deep Lake field. Shell Oil Co.'s H. A. Miller 1, in 34-15s-3w, flowed 3.2 million from 6944-60 feet, 14/64-inch, completed 7-22-53, TD 12,498.

St. Mary Parish, Charenton field. The California Co.'s State Lease 2044-3, in 29-13s-10e, flowed 0.3 million from 2378-86 feet, 9/64-inch, completed 7-8-53, TD 10,981.

MICHIGAN—OIL FIELD EXTENSION

Mason County, Eden field. Augie Busk & Carl Grimes & Earl Hess, Jr.'s Barothy et ux 1, NW NE NW 36-17n-16w, Eden Township, ½-mile southeast extension, flowed 100 barrels from Dundee lime, Devonian 2287-90 feet, TD 2290.

MICHIGAN—NEW GAS FIELD

Missaukee County. States Oil Co.'s Gray 1, C SW 32-23n-5w, Enterprise Township, flowed 3.5 million from Stray sand, mississippian 986-991 feet, TD 991.

MISSISSIPPI—NEW OIL FIELD

Wilkinson County. Gulf Refining Co.'s Crosby Lumber & Manufacturing Co. et al 30, in 20-4n-2w, flowed 120 barrels from Wilcox sand, Eocene 5091-93 feet, ⅛-inch, 35.5-gravity, completed 7-24-53, TD 7200.

MISSISSIPPIAN—NEW OIL PAY

Jefferson County, Sunnyside field. J. Willis Hughes' R. G. Hall-G. W. Armstrong Unit 1, in 35-8n-1w, flowed 216 barrels from Artman sand, Eocene 5478-82 feet, 10/64-inch, 40-gravity, completed 7-12-53, TD 5600.

MISSISSIPPI—OIL FIELD EXTENSION

Wayne County, Chaparral field. Gulf's Chapman-Smith Unit 1, in 13-10n-7w, 1-mile northwest extension, pumped 102 barrels from Travis sand, Upper Cretaceous 4313-17 feet, 16.9-gravity, completed 7-4-53, TD 9170.

MISSISSIPPI—NEW DISTILLATE FIELD

Clay County, Siloam field. Carter Oil Co.'s Mattie B. McFadden et al 1, C NW SE 36-16s-5e, flowed 2 barrels distillate and 0.6 million from McFadden sand, Mississippian 8614-33 feet, ¼-inch, 59-gravity, completed 7-22-53, TD 9580.

MONTANA—NEW OIL FIELDS

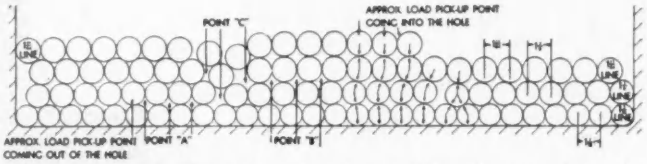
Big Horn County. George Greer-Delhi Oil Corp.'s Kendrick 5, SE NW NW 6-1s-35e, pumped 95 barrels from Tensleep sand, Pennsylvanian 4630-46 feet, completed 7-30-53, TD 4688.

Richland County. Sun & Phillips' Dynneson 1, C SW NE 32-24n-58e, flowed 100

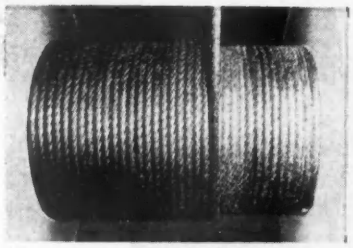
PAGES FROM THE LEBUS WIRE LINE SPOOLING HANDBOOK

PROGRESSIVE GROOVING

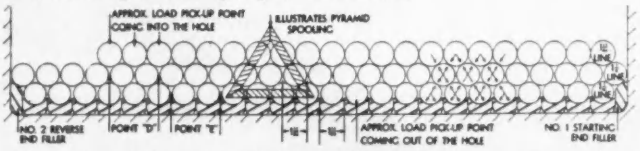
Eliminates WIRE LINE CUTTING IN!



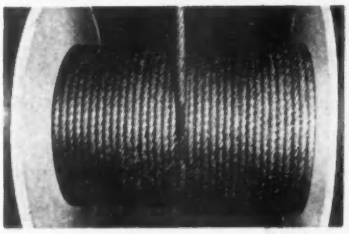
Above is an illustration of the plain drum spooling of a worn, tapered or stretched 1 1/8" wire line. Notice gaps, slipping over and cutting in at A, B, and C. Notice also amount of line needed for load pick-up when coming out and going back into hole.



These two photos show the second and third layers of line being spooled on parallel side of LeBus Grooved Drum. They further illustrate Progressive Grooving attained with LeBus Grooving.


APPROX. LOAD PICK-UP POINT COMING INTO THE HOLE
ILLUSTRATES PYRAMID SPOOLING
NO. 2 REVERSE END FILLER
POINT "D"
POINT "E"
APPROX. LOAD PICK-UP POINT COMING OUT OF THE HOLE
NO. 1 STARTING END FILLER

Above is a LeBus grooved drum with the same worn, tapered or stretched 1 1/8" wire line. NO GAPS, NO SLIP-OVER, NO CUTTING IN. NOTICE that less line is required for load pick-up when coming out or going back into hole.



In the past, one of the greatest sources of trouble in wire line spooling has been the wire line **CUTTING IN.** This is due principally to the haphazard or uncertain line action of helical spooling. With helical spooling, it is difficult to prevent worn line from slipping over while lifting excessively heavy loads. Under the new LeBus System of Controlled Pyramid Spooling where 75% to 85% of the wire line forms grooves for the succeeding wraps (illustrated by diagrams above and photos to left), we accomplish what is called **PROGRESSIVE GROOVING** with 75% to 85% of each layer of wire line wraps. By this method, **CUTTING IN** can be eliminated, since each layer of wire line is held in grooves formed by the preceding layer of wraps.

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Firm Name_____

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0-9

DISCOVERIES . . .

barrels from Red River lime 12,585-605 feet, 12/64-inch, 48.7-gravity, completed 7-1-53, TD 12,671.

Toole County. Fair-Ashland Refining Co.'s Parker-Clifford 1, SW SE NW 5-37n-4w, pumped 190 barrels from Moulton sand, Upper Cretaceous 2522-70 feet, completed 7-31-53, TD 2570.

MONTANA—NEW GAS FIELD

Liberty County, Flat Coulee area. Northern Petroleum Co.'s Government 1, NE NW NW 15-37n-5e, flowed 6.3 million from Bow Island sand 1802-11 feet, completed 7-1-53, TD 1811.

NEBRASKA—NEW OIL FIELD

Kimball County. Natural Gas & Oil Corp.'s Robinson 1, E½ SE SE 26-15n-55w, pumped 250 barrels from "J" sand, Upper Cretaceous 6002-29 feet, 36.2-gravity, completed 7-30-53, TD 6075.

NEBRASKA—NEW GAS FIELD

Deuel County. Sherrod & Apperson's Kontz 1, SW SW SW 10-13n-43w, flowed 3.0 million from "D" sand, Upper Cretaceous 3276-3302 feet, completed 7-1-53, TD 3550.

NEW MEXICO—NEW OIL FIELDS

Eddy County. Richardson & Bass' George H. Cobb-Federal 1, in 23-20s-31e, pumped 215 barrels oil and 35 barrels water from Delaware sand, Permian 7003-16 and 7022-35 feet, 40.5-gravity, completed 7-27-53, TD 16,459.

Lea County. Neville G. Penrose, Inc.'s Stella Zimmerman 1, in 15-14s-31e, pumped 34 barrels from Queen sand, Permian 2867-99 feet, 30-gravity, completed 6-23-53, TD 4139.

NEW MEXICO—NEW GAS FIELDS

Rio Arriba County. Superior Oil Co.'s Sealy 1-5, NW NE SE 5-25n-6w, flowed 1.5 million from Pictured Cliffs sand, Upper Cretaceous 2367-97 feet, completed 5-20-53, TD 2397.

San Juan County. Phillips' Mesa Unit 32-7-3-18, SW NE NE 18-32n-7w, flowed 1.4 million from Fruitland sand, Upper Cretaceous 2766-2794 and 2794-2806 feet, completed 7-31-53, TD 5002.

NORTH DAKOTA—NEW OIL FIELDS

Bottineau County. Ray Holbert Drilling Co.'s Ekrehagen Estate 1, C NE SE 9-163n-78w, pumped 5 barrels from Madison lime, Mississippian 3055-86 feet, completed 7-14-53, TD 3086.

McKenzie County. Amerada Petroleum Corp.'s Steve Yttredahl 1, C SW NE 33-154n-95, flowed 142 barrels from Madison lime, Mississippian 8246-8300 feet, 16/64-inch, 43.2-gravity, completed 6-23-53, TD 8376.

OHIO—OIL FIELD EXTENSION

Licking County, Newark field. Waverly Oil Works' Paul Meyers 1, Section 25, Hanover Township, flowed 40 barrels from Clinton sand, Silurian 2950-78 feet, completed 7-16-53, TD 2981.

OKLAHOMA—NEW OIL FIELDS

Kay County. Sam A. King's Kahle 1, NE NE NW 19-28n-2e, pumped 17 barrels oil and 30 barrels water from Cleveland sand, Pennsylvanian 3185-3223 feet, TD 3717.

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DISCOVERIES . . .

Lincoln County. Mitchell-Gage & William T. Singley's Thompson 1, NE NE SW 32-13n-2e, pumped 15 barrels from Skinner sand, Pennsylvanian 6064-70 feet, 35-gravity, TD 5080.

Logan County, Marshall, Northeast field. Ashland Oil & Refining Co. & Redland Oil Co.'s Velvie Bridal 1, C NW NW SE 5-19n-4w, flowed 140 barrels oil and 0.4 million from Peru sand, Pennsylvanian 5292-5308 feet, 20/64-inch, TD 6483.

Noble County. Carter's Max Schaffer Heirs 1, C SW NW SW 21-22n-2w, flowed 352 barrels from Misner sand, Mississippian 4991-5003 feet, 5/64-inch, TD 5173.

Osage County. Hanlon-Boyle's Osage 1, SW SW NE 5-28n-9e, flowed 96 barrels oil from Wayside sand, Pennsylvanian 1620-39 feet, 6/32-inch, TD 1637.

Unnamed field. Ora. A. Shaw's Osage 1, SW SW SE 34-24n-7e, pumped 21 barrels oil and 89 barrels water from Burbank sand, Pennsylvanian 2543 feet, TD 2685.

Payne County. Anderson-Prichard Oil Corp. & N. V. Duncan's Adams 1, C SW SW SE 22-19n-2e, pumped 7 barrels oil and 220 barrels water from Upper Skinner sand, Pennsylvanian 3983 feet, TD 4700.

Stephens County, Royal, West field. Phillips' Oakman 1, SE NE SE 2-1n-4w, pumped 6 barrels from Pennsylvanian Conglomerate 6070-90, 6540-60 and 7465-80 feet, 38.7-gravity, TD 9478.

OKLAHOMA—NEW OIL PAY

Oklahoma County, Higbee, Northwest field. Mohawk Drilling Co.'s Price 1, SE NW SW 19-14n-3w, pumped 23 barrels from Bois D'Arc lime, Devonian 6459-73 feet, TD 6738.

OKLAHOMA—OIL FIELD EXTENSIONS

Garfield County, Prairie Valley, Northeast field. McBride & Portable Drilling's Mae McPherson 1, NE NE NE 7-23n-4w, southwest extension, flowed 2 barrels distillate and 1.9 million from Mississippi lime, Mississippian 5537-56 feet and flowed 25 barrels oil and 10 barrels water from 1st Wilcox sand, Ordovician 6136-43 feet, 4/64-inch, TD 6237.

Lincoln County, Strowd, Northeast field. James M. McDaniels' Wickham Estate 1, NE NE NE 11-15n-6e, north extension, pumped 75 barrels from Simpson dolomite, Ordovician 3700-06 feet, 42-gravity, TD 3772.

Logan County, Lovell, North field. Altus Drilling Co.'s Albert Schaefer 1, C SE SE SE 33-19n-4w, flowed 18 barrels oil and 2 barrels water from Lower Layton sand, Pennsylvanian 4761 feet, ½-inch, TD 4811.

Okfuskee County, Cary field. Ben J. Taylor's Spickard 1, NE NE SW 21-12n-10e, pumped 35 barrels from Cromwell sand, Pennsylvanian 3054-68 feet, TD 3102.

Hayden-Ville field. E. E. Beatty & Carlos Oil's Hayden A-1, NW NW SW 17-13n-10e, 1-mile extension, flowed 500 barrels from Upper Gilcrease sand, Pennsylvanian 2801-20 feet, ½-inch, TD 2861.

Stephens County, Royal, West field. Phillips' Chism 1, NE SE NW 2-1n-4w, ⅝-mile northwest extension, flowed 130 barrels from Pennsylvanian Conglomerate 7035-65 and 7455-7673 feet, 18/64-inch, 35.7-gravity, TD 10,866.

OKLAHOMA—NEW DISTILLATE FIELDS

Noble County. Falcon Seaboard et al's Finch 1, NE SW SW 20-24n-1w, Old Well Worked Over, flowed 48 barrels distillate and 16.2 million from Skinner sand, Pennsylvanian 4100 feet, open, TD 4574.

Oklahoma County. Calvert Drilling Co. et al's Salisbury 1, SW SE NE 13-14n-4w, flowed 80 barrels oil and 2.0 million from Dolomite sand, Ordovician 6409-6520 feet, 17/64-inch, and flowed 39 barrels distillate and 9.9 million from 2nd Wilcox sand, Ordovician 6658-62 feet, 15/64-inch, TD 6749.

OKLAHOMA—GAS FIELD EXTENSIONS

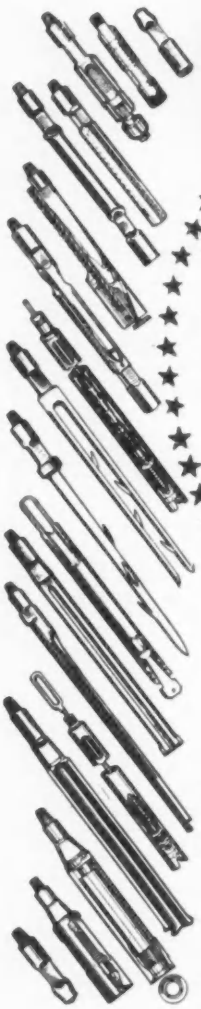
Canadian County, El Reno field. Sinclair's Community Wise Unit 1, NW SE SW 14-12n-7w, ⅝-mile southwest extension, flowed 7.1 million from 2nd Wilcox sand, Ordovician 10,320-350 and 10,380-420 feet, TD 10,828.

Lincoln County, Davenport field. Harper & Turner's Tipton 1, NW NW NW 26-15n-5e, flowed 1.5 million from Prue sand, Pennsylvanian 3406-21 feet, TD 4580.

TEXAS DISTRICT 1—NEW OIL FIELDS

Dimmitt County. Bay City Drilling Co.'s Rosa E. Crenshaw Estate 1, Cross S. Ranch Subdivision, Section 177-A flowed 88 barrels from Olmos sand, Upper Cretaceous 3627-34 feet, 12/64-inch, 31-gravity, completed 7-11-53, TD 5156.

Wilson County. Lake Rice Mill's Fritz Mueller 1, Manuel Ximenez Survey, flowed



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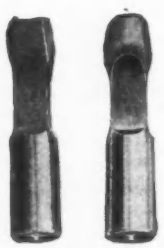
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DISCOVERIES . . .

127 barrels from Austin Chalk, Upper Cretaceous 2797-2855 feet, ⅛-inch, 32.9-gravity completed 7-18-53, TD 2855.

TEXAS DISTRICT 1—NEW DISTILLATE PAY

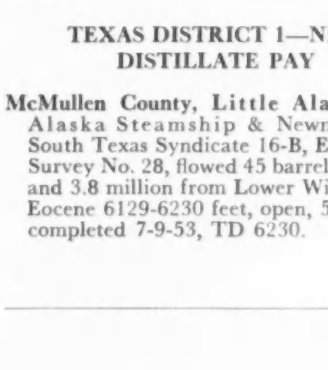
McMullen County, Little Alamo field. Alaska Steamship & Newman Bros.' South Texas Syndicate 16-B, E. M. Beall Survey No. 28, flowed 45 barrels distillate and 3.8 million from Lower Wilcox sand, Eocene 6129-6230 feet, open, 56-gravity, completed 7-9-53, TD 6230.

TEXAS DISTRICT 1—NEW GAS FIELD

Frio County. George Parker's Martha F. Berry, et al 1, Matthew C. Patton Survey 1178, flowed 4.1 million from Olmos sand, Upper Cretaceous 2975-3001 feet, open, completed 7-6-53, TD 3001.

TEXAS DISTRICT 2—NEW OIL FIELD

Jackson County. Sam G. Harrison's Edwin L. Whisler et al 1, John Davis Survey, flowed 69 barrels from Frio sand, Oligocene 6468-70 feet, 5/64-inch, 44.3-gravity, completed 10-26-53, TD 6609.



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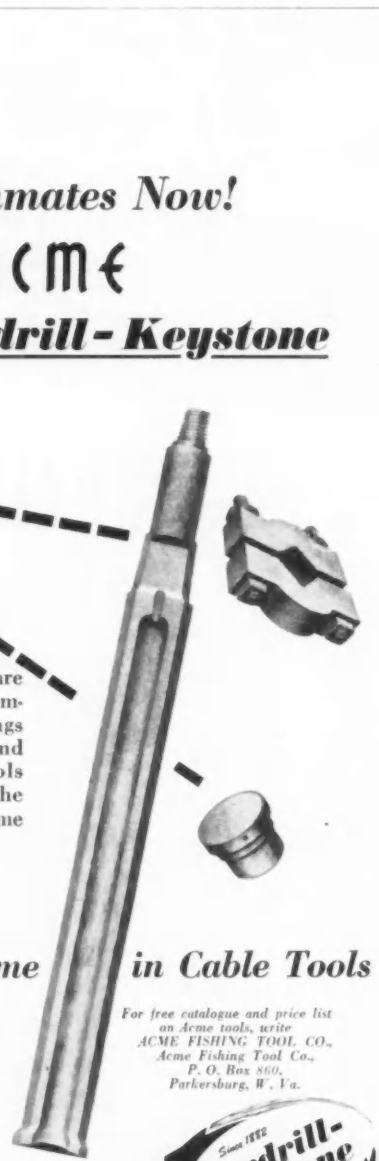

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TEXAS DISTRICT 2—NEW OIL PAY

Bee County, San Domingo field. James R. Daugherty Estate's R. T. Hicks 12, Jose Marie Urango Survey, flowed 33 barrels from Vicksburg sand, Oligocene 2876-78 feet, ⅛-inch, 24.7-gravity, completed 7-1-53, TD 8141.

TEXAS DISTRICT 2—OIL FIELD EXTENSIONS

Goliad County, Terrell Point, West field. Paul J. Fly et al's Lula Swickheimer et al 3, William Patterson Survey, ½-mile south extension, flowed 135 barrels from Yegua sand, Eocene 4017-20 feet, 9/64-inch, 27-gravity, completed 7-2-53, TD 5115.

Jackson County, Portes field. Alaska Steamship Co. & Newman Bros. Drilling Co.'s A. Pargman 1, Victor Blanco Survey, 1-mile south extension, flowed 45 barrels from Yegua sand, Eocene 4055-59 feet, 9/64-inch, 42-gravity, completed 7-14-53, TD 7455.

TEXAS DISTRICT 2—NEW DISTILLATE PAY

Goliad County, Husky field. Dallas Husky & W. Earl Rowe's J. E. McCord 1, Noah G. Stebbins Survey, flowed 200 barrels distillate and 16.8 million from Yegua sand, Eocene 4733-59 feet, open, 58-gravity, completed 7-11-53, TD 4840.

TEXAS DISTRICT 3—NEW OIL FIELDS

Colorado County. Humble's J. F. Walker, et al 1, G. W. Taylor Survey, flowed 16 barrels from Yegua sand, Eocene 6726-30 feet, ¼-inch, 40.9-gravity, completed 7-9-53, TD 10,017.

Harris County. R. W. Ramey's W. T. Jones et al, et ux 1, J. C. Donnelly Survey, flowed 138 barrels from Kob (Cockfield) sand, Eocene 5862-65 feet, ⅛-inch, 36-gravity, completed 7-8-53, TD 5918.

Liberty County. Austral Oil & Exploration Co., Inc.'s Fannie Worrall, et al 1, William Harris Survey, flowed 43 barrels from Cook Mountain sand, Eocene 8540-64 feet, ⅜-inch, 30-gravity, completed 7-3-53, TD 8850.

Unnamed field. Progress Petroleum Co. of Texas' J. E. Broussard et al 1, S. D. Joscelyn Survey, Section 32, flowed 182 barrels from Nodosaria sand, Oligocene 8510-14 feet, 13/64-inch, 38.7-gravity, completed 7-5-53, TD 8776.

TEXAS DISTRICT 3—NEW OIL FIELDS

Brazoria County, Chocolate Bayou field. Phillips' Houston T-1, E. Andrews League, Tract 31, flowed 334 barrels from Frio (Banfield 13 Zone) sand, Oligocene 11,054-065 feet, 12/64-inch, 30.4-gravity, completed 6-10-53, TD 14,578.

Fort Bend County, Fulshear-Northeast Flank field. L. D. French's Earl H. Roesner 4, I&GN RR Survey, Section 3, flowed 108 barrels from Hilderbrand sand, Eocene 6971-74 feet, 12/64-inch, 46.5-gravity, completed 7-24-53, TD 7511.

Jefferson County, Clam Lake field. Shell's McFaddin Trust 30, S. A. Pace Survey, flowed 70 barrels from Pliocene sand 2390-94 feet, 28/64-inch, 23-gravity, completed 7-15-53, TD 3003.

Liberty County, North Dayton-East Flank field. San Jacinto Petroleum Corp.'s T. I. Whitley-Gulf 1, H. H. Nolan Survey, flowed 108 barrels from 4438-46 feet, 10/64-inch, 31.4-gravity, completed 7-18-53, TD 4813.

Montgomery County, Kuhlman field. Lamar Hunt Trust Estate's Mary Louise Fitch 2, Chas. Esterwald Survey, flowed 99 barrels from Yegua sand, Eocene 6063-71 feet, 7/64-inch, 37-gravity, completed 6-24-53, TD 7364.

Orange County, Orange field. Ed R. Bennett's L. H. Harmon-Gulf Fee 1, William Dyson Survey, flowed 185 barrels from Basal Frio sand, Oligocene 6552-58 feet, 9/64-inch, 31.2-gravity, completed 7-11-53, TD 6804.

Orange field. Sun Oil Co.'s Linscomb et al 1, James Dyson Survey, flowed 124 barrels from Lower Hackberry sand, Oligocene 8468-84 feet, 7.64-inch, 43.7-gravity, completed 7-5-53, TD 9412.

Tyler County, Hillister, East field. C. N. Housh's Rice Institute C-3, G&BN Co. Survey, flowed 117 barrels from Y-E sand, Eocene 4900-01 feet, 10/64-inch, 37.9-gravity, completed 7-9-53, TD 4944.

TEXAS DISTRICT 3—OIL FIELD EXTENSION

Polk County, New Ace field. The Texas Co.'s West Lumber Co. Fee 1, G. S. Thomas Survey, south extension, flowed 144 barrels from Wilcox sand, Eocene 7859-64 feet, 10/64-inch, 34.4-gravity, completed 7-20-53, TD 7920.

TEXAS DISTRICT 3—NEW DISTILLATE FIELDS

Brazoria County, Rowan, North field. R. L. Daniels & M. W. Messer's Rosa Clark et al 1, Francis Moore Survey, Block 26, flowed 1580 barrels distillate and 140.0 million from Basal Frio sand, Oligocene 10,815-829 feet, open, 41.9-gravity, completed 7-9-53, TD 10,829.

Galveston County. Placid Oil Co.'s Anna Anderson Unit 1, E. T. Mitchell, et al Survey, Lot 144, flowed 1030 barrels distillate and 27.5 million from Frio sand, Oligocene 9917-35 feet, 49.5-gravity, completed 7-23-53, TD 9934.

Montgomery County, "Conroe, North" field. Texmo Oil Co. et al's Hutchings-Sealy National Bank 1, J. C. Pitts Survey, flowed 60 barrels distillate and 3.0 million from Wilcox sand, Eocene 10,622-640 feet, 50.7-gravity, completed 7-12-53, TD 11,828.

Wharton County. Caroline Hunt Sands' Robert Polasek et al 1, BBB&C RR Co. Survey, Section 1, flowed 195 barrels distillate and 47.0 million from 5531-36 feet, open, completed 6-21-53, TD 6580.

TEXAS DISTRICT 3—NEW DISTILLATE PAY

Matagorda County, Wadsworth field. Magnolia's Hamilton Savage 2, J. C. Peyton League, flowed 155 barrels distillate and 41 barrels water and 2.2 million from Frio sand, Oligocene 9668-73 feet, 12/64-inch, completed 5-26-53, TD 12,006.

TEXAS DISTRICT 3—DISTILLATE FIELD EXTENSION

Wharton County, Menefee field. Progress Petroleum Co.'s Babcock 1, S. P. Middleton ¾ League, ⅔-mile east extension, flowed 34 barrels distillate and 34.0 million from Frio sand, Oligocene 5252-55 feet, 55.6-gravity, completed 6-30-53, TD 5758.

TEXAS DISTRICT 3—NEW GAS FIELD

Brazoria County. Brazos Oil & Gas Co.'s Fletcher Trust Co. 1, John Martin Survey, flowed 28.0 million from 5266-70 feet, open, completed 7-23-53, TD 7415.

TEXAS DISTRICT 3—NEW GAS PAY

Wharton County, Mauritz, East Flank field. Johnson & Appling's Kountze & Stewart "C" 1, L. L. Miller Survey, flowed 6.2 million from Lower Frio sand, Oligocene 6770-75 feet, open, completed 7-8-53, TD 7389.

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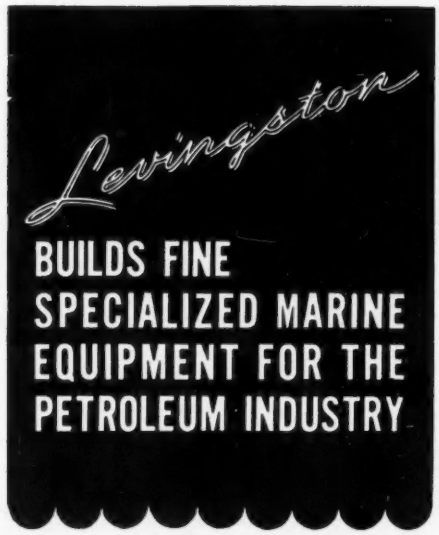
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DISCOVERIES . . .

TEXAS DISTRICT 4—NEW OIL FIELD

Webb County. Dulaney Oil Co. et al & G. G. Mortimer Jr.'s R. E. Welhausen 1, CCSD&RGNG RR No. 18, Block 2, pumped 14 barrels from Bruni sand, 2622-27 feet, 47.6-gravity, completed 7-6-53, TD 2692.

TEXAS DISTRICT 4—NEW OIL PAYS

Aransas County, Fulton Beach, East field. Mrs. Mazie Wrather's Live Oak Apts. et al 1, Wm. Carper Survey, A. L. Bachman Subdivision, Outlot 7, flowed 80 barrels from Frio (D-1) sand, Oligocene 7467-71 feet, 7/64-inch, 44.6-gravity, completed 7-13-53, TD 7862.

Duval County, Charamousca field. N. V. Duncan's Worden & Drought 26, GC&SF RR Survey 151, pumped 22 barrels from 746-754 feet, completed 7-9-53, TD 754.

Nueces County, Corpus Channel field. Sun Oil Co.'s Corpus Christi A-21-1, subdivision Corpus Christi Bay State Tract 21, flowed 182 barrels from 8459-66 feet, 8/64-inch, 40.2-gravity, completed 7-2-53, TD 8717.

Clarkwood, South field. The Chicago Corp.'s Jonas Weil 2, J. H. Gallagher No. 318, flowed 139 barrels from Jonas sand 7232-34 feet, 8/64-inch, 44-gravity, completed 7-1-53, TD 7237.

San Patricio County, Ewing field. Bridwell & Darsey's Kirby Sharp Estate Unit 1, Lot 1, Section 25, George H. Paul's Subdivision of Coleman Fulton Pasture Co. Lands, flowed 142 barrels from Sims sand 5889-92 feet, 11/64-inch, 36.7-gravity, completed 79-53, TD 6855.

Ewing field. The Chicago Corp.'s Sims-Parks Unit 1, George H. Paul Subdivision Coleman-Fulton Pasture Lands, Section 12, Lot 16, flowed 134 barrels from Parks sand 5892-5900 feet, ⅛-inch, 38-gravity, completed 7-1-53, TD 6844.

Gaines field. F. Wm. Carr's W. C. Gaines, et al 1-A, Welder & Odem Subdivision, Block 32, Old Well Worked Over, flowed 33 barrels from Gaines (6200) sand 6741-46 feet, ¼-inch, 29-gravity, completed 6-16-53, TD 8315.

Starr County, Sun field. Humble's N. R. Montalvo 12, Los Retaches "Juan Jose Sais Grant," flowed 39 barrels from F-4 Middle Frio-Vicksburg sand, Oligocene 4929-42 feet, ⅛-inch, 43.8-gravity, and flowed 35 barrels from F-4 Upper Frio-Vicksburg sand, Oligocene 4890-98 feet, ⅛-inch, 44.2-gravity, completed 7-15-53, TD 7000.

Yzaguirre field. Taylor Oil & Gas Co.'s Don Cameron, et al 5, flowed 61 barrels from Frio (5100) sand, Oligocene 5136-39 feet, 7/64-inch, 46.9-gravity, completed 7-2-53, TD 5158.

TEXAS DISTRICT 4—NEW DISTILLATE FIELDS

Jim Wells County, "Falfurrias, East" field. La Gloria Corp.'s Edwin Schroeder Unit 1, Burton & Danforth Subdivision, Block 10, Lot 2, flowed 490 barrels distillate and 14.0 million from Schroeder sand 7066-88 feet, open, 54.9-gravity, completed 6-16-53, TD 9556.

Kenedy County, "Potrero Lopena" field. Sun Oil Co.'s Laguna State 297-2, Subdivision Laguna Madre Tract 297, flowed 36 barrels distillate and 9.0 million from Marginulina sand, Oligocene 7430-48 feet, open, 49.5-gravity, completed 7-10-53, TD 7947.

Unnamed field. Sun's Lagna Madre A-222-1, Subdivision Laguna Madre State Tract 222, flowed 58 barrels distillate and 14.5 million from Marginulina sand, Oligocene 7293-7312 feet, open, 48.1-gravity, completed 7-14-53, TD 7506.

TEXAS DISTRICT 4—NEW DISTILLATE PAYS

Duval County, Seven Sisters field. Blanco Oil Co. & Estate of A. A. Buchanan's J. F. Welder Hrs. A-14, Poitevent Survey, Section 385, flowed 630 barrels distillate and 34.4 million from Queen City sand, Eocene 5874-94 feet, open, 61-gravity, completed 7-22-53, TD 5960.

Hidalgo County, Edinburg, East field. Union Producing Co.'s Paul Anderson 1, Lino Cavazos Grant, Hill & Halbert A-57 (Beamer) Subdivision, Block 57, flowed 27 barrels distillate and 5.1 million from Anderson sand 7716-29 feet, open, 48.0-gravity, completed 7-9-53, TD 8500.

Starr County, Doss field. The Chicago Corp.'s J. M. Doss 1, Porcion 40, 1-mile southwest of production, flowed 30 barrels distillate and 3.1 million from Upper Sullivan sand, Oligocene 3740-50 feet, 60-gravity, completed 6-11-53, TD 6517.

TEXAS DISTRICT 4—DISTILLATE FIELD EXTENSION

Hidalgo County, San Salvador field. Western Natural Gas Co.'s A. M. Gardenas B-1, San Salvador Del Tule Grant, Sec-

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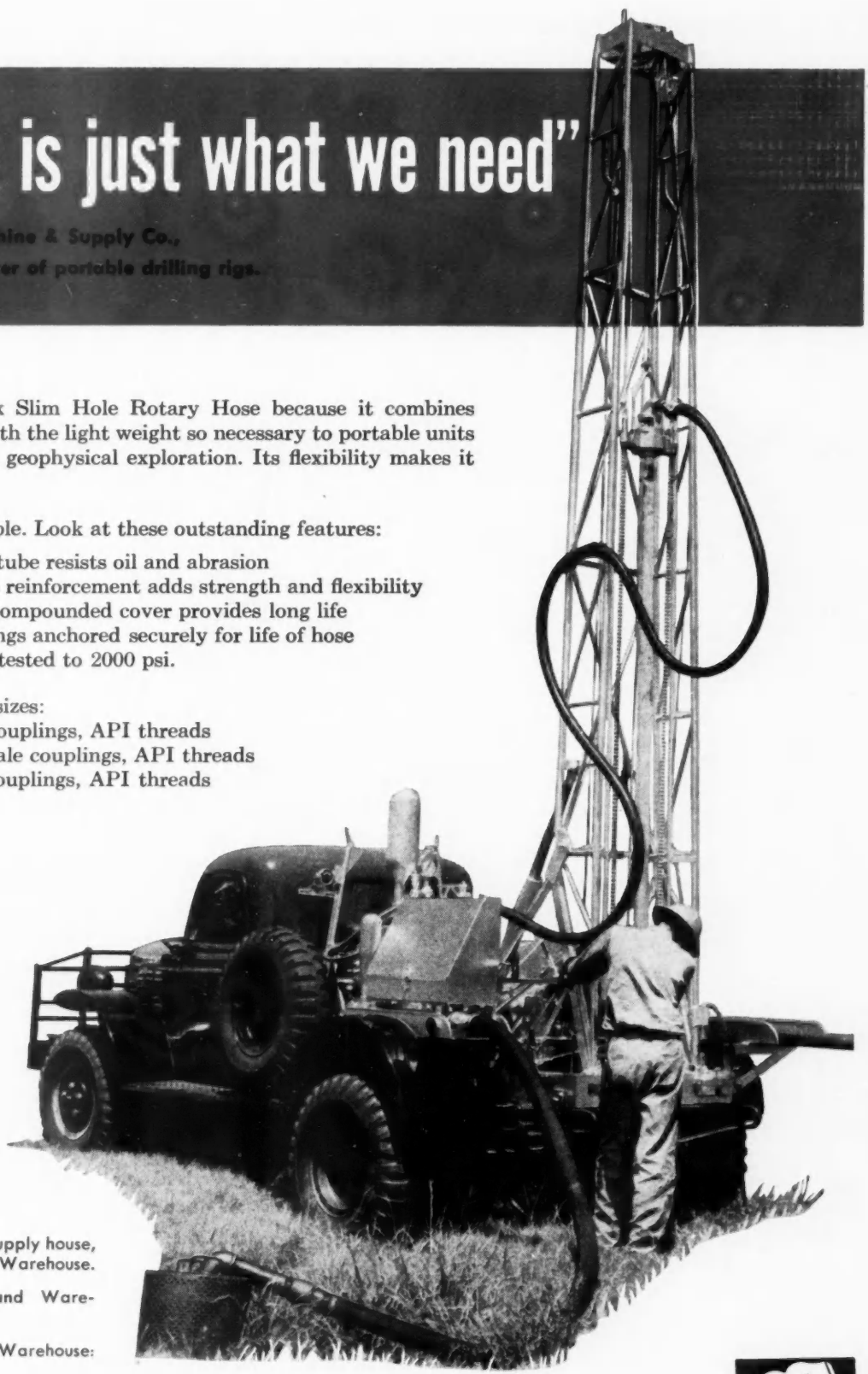

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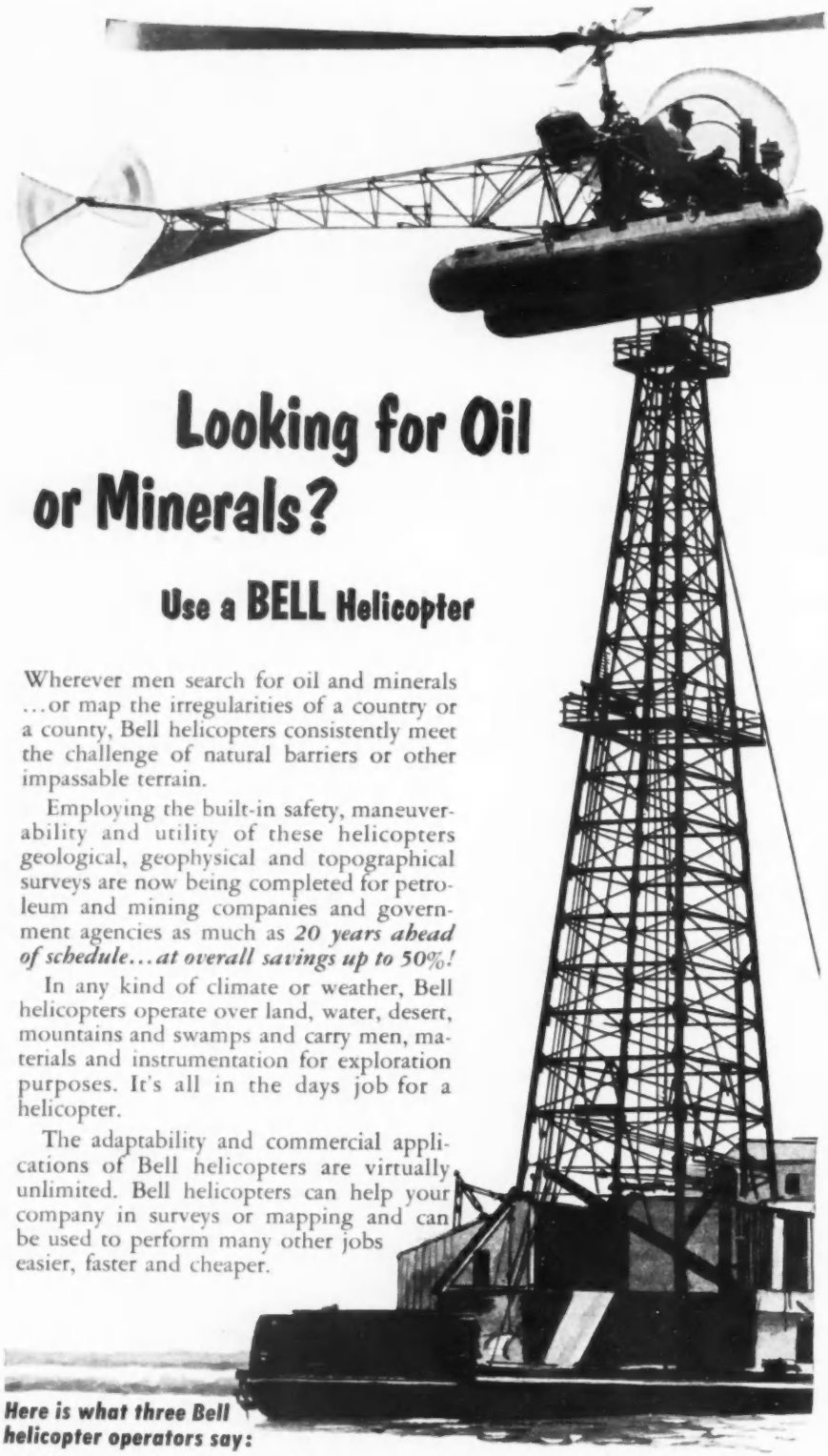

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tion 158, ¾-mile northwest extension, flowed 23 barrels distillate and 15.0 million from Frio "D" sand, Oligocene 8104-18 feet, 58.3-gravity, and flowed 120 barrels distillate and 42.5 million from Frio "F" sand, Oligocene 8414-40 feet, 51.5-gravity, completed 7-15-53, TD 9194.

TEXAS DISTRICT 4—NEW GAS FIELD

Willacy County, Willamar, Southeast field. Humble's Sauz Ranch-Nopal 7, San Juan de Carricitos Grant, Share 7-B, flowed 3.5 million from Frio 7851-89 feet, open, completed 7-1-53, TD 8210.

TEXAS DISTRICT 6—NEW OIL FIELD

Harrison County, North Lansing field. John C. Robbins' Still 1-E, David Hill Survey, Old Well Worked Over, pumped 61 barrels from Young sand, Lower Cretaceous 6957-7000 feet, 39.2-gravity, completed 7-13-53, TD 7000.

TEXAS DISTRICT 7-C—NEW OIL FIELDS

Concho County. Progress Petroleum's Ed Speck 2, Michael Theis Survey 2002, pumped 50 barrels, oil and 20 barrels water from 3656-86 feet, 2-inch, 37.2-gravity, completed 6-22-53, TD 3686.

Crockett County. Continental Oil Co.'s Harris 2-C, Section 4, Block BB-2, Francis Boren Survey, flowed 364 barrels oil and 32 barrels water from Strawn sand, Pennsylvanian 8171-91 feet, 14/64-inch, 47-gravity, 7-22-53, TD 8247.

McCulloch County. L. B. Thomas et al's R. & H. Hoepfull 1, Section 14, A. Ogden Survey, pumped 30 barrels from Canyon sand, Pennsylvanian 1735-40 feet, 40-gravity, completed 5-13-53, TD 2021.
Unnamed field. R. Williamson et al's Willie Siler et al 1, Section 1347, D. Rothenburg Survey, flowed 209 barrels from Strawn sand, Pennsylvanian 1675-81 feet, 12/64-inch, 38-gravity, completed 7-8-53, TD 1920.

Runnels County. S. C. Herring's M. S. Hale 1, Isaac P. Wallace Survey 139, flowed 48 barrels from Gardner sand, Pennsylvanian 3805-14 feet, ¼-inch, 40-gravity, completed 6-19-53, TD 4044.
Unnamed field. Thomas D. Humphrey & Sons' Thomas C. Hall 1, Block 153, ETRR Survey, flowed 81 barrels from Gardner sand, Pennsylvanian 3848-58 feet, 18/64-inch, 38.8-gravity, completed 7-27-53, TD 4793.

Tom Green County. Crown Central Petroleum Corporation's R. E. Broz 1, Section 89, District 11, SPRR Survey, flowed 149 barrels from Ellenburger lime, Ordovician 5240-55 feet, 14/16-inch, 38-gravity, completed 7-8-53, TD 5410.

TEXAS DISTRICT 7-C—NEW OIL PAY

Crockett County, Noelke field. Ledge Petroleum Company, Inc.'s Bouscaren Heirs 1-A, Section 57, Block GG, TCRR Survey, flowed 60 barrels from Clearfork sand, Permian 3565-80 feet, ¾-inch, 41.6-gravity, completetd 6-19-53, TD 4810.

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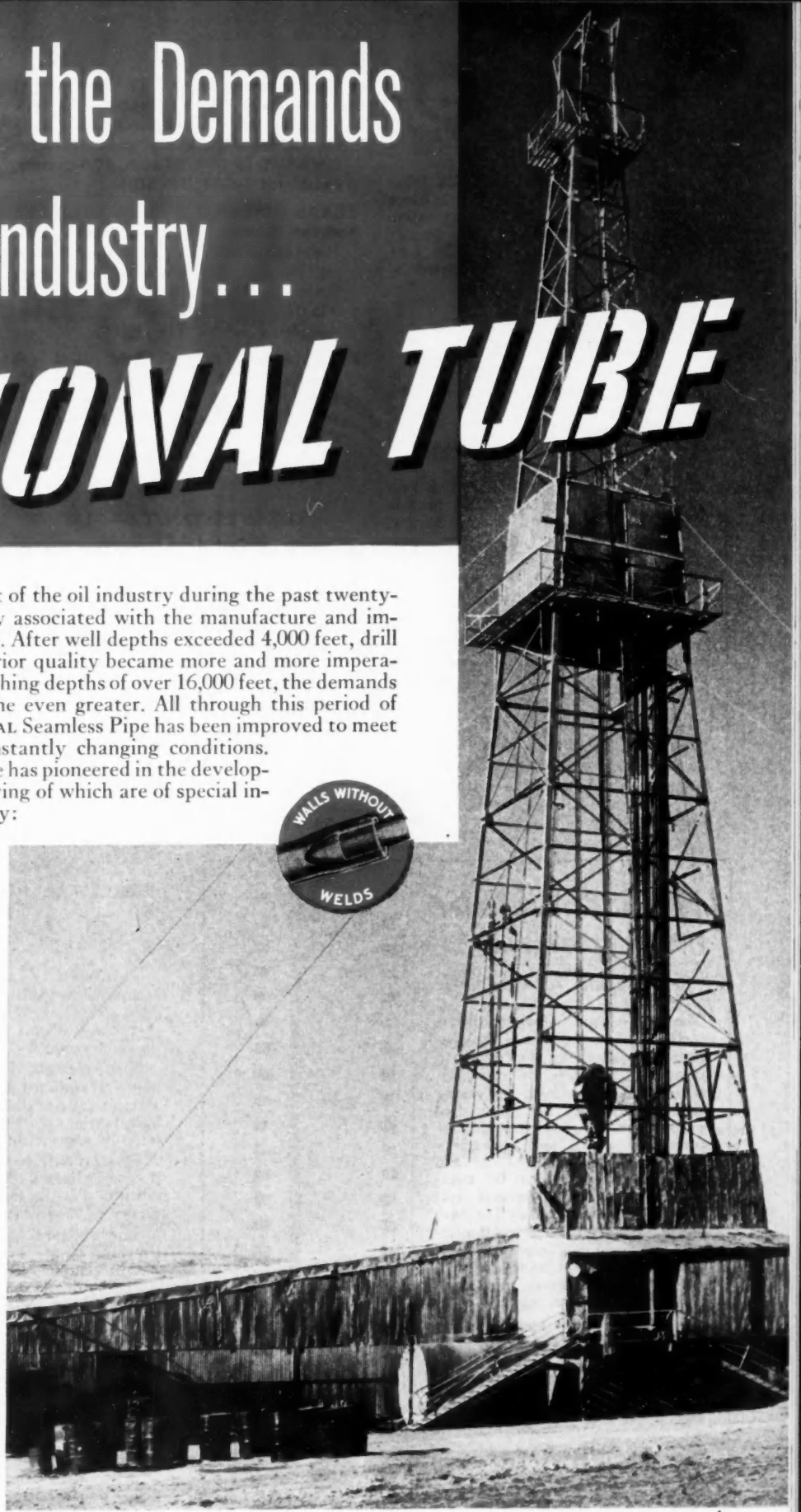

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DISCOVERIES . . .

TEXAS DISTRICT 7-C—OIL FIELD EXTENSION

Coke County, Jameson field. F. Kirk Johnson's W. C. Blanks 1-B, Section 2, Block 2, H&TC Survey, 1½-mile west extension, flowed 113 barrels from Strawn sand, Pennsylvanian 6262-6372 feet, 12/64-inch, 44.7-gravity, completed 6-29-53, TD 6454.

TEXAS DISTRICT 8—NEW OIL FIELDS

Andrews County. The Texas Co.'s J. E. Parker H1, Section 15, Block A-46, PSL Survey, flowed 1102 barrels from Wolfcamp lime, Permian 8596-8608 and 8623-36 feet, ½-inch, 37.5-gravity, completed 7-9-53, TD 8823.

Ector County. British American Oil Producing Co.'s Millard Edison 1, Section 26, Block 45, T-2-S, T&P Survey, pumped 96 barrels from Lower Pennsylvanian sand 7930-8032 feet, 40.6-gravity, completed 6-21-53, TD 8953.

Martin County. Phillips' Schar "C" 1, League 324, LaSalle CSL Survey, pumped 59 barrels from Wolfcamp lime, Permian 9000-26 and 9321-82 feet, 40.1-gravity, completed 7-17-53, TD 13,140.

Reeves County. Buffalo Oil Co.'s Herman Lindley 1, Section 8, Block 56, T-3, T&P Survey, pumped 55 barrels from Delaware sand, Permian 3406-10 and 3422-32 feet, 34.1-gravity, completed 7-2-53, TD 3562.

Winkler County. Magnolia's University of Texas Lease 39862-1, Section 11, Block 20, University Lands Survey, flowed 67 barrels from Delaware sand, Permian 5099-5105 feet, 24/64-inch, 40.5-gravity, completed 7-8-53, TD 5105.

TEXAS DISTRICT 8—NEW OIL PAYS

Andrews County, Andrews, South field. Humble's State University 2-0, Section 20, Block 1, University Lands Survey, flowed 203 barrels from Devonian 11,035-075 feet, 14/64-inch, 43.8-gravity, completed 7-3-53, TD 11,107.

Ector County, Penwell field. Gulf Oil Corp.'s W. E. Connell B-34, Section 13, Block B-16, PSL Survey, flowed 312 barrels oil and 27 barrels water from Lower Clearfork lime, Permian 4960-90 feet, 24/64-inch, 39.1-gravity, completed 2-5-53, TD 7398.

TEXAS DISTRICT 8—NEW DISTILLATE PAY

Ward County, Ward, South field. Luse & Ice's J. O. Brictson 1-A, Section 6, Block 32, H&TC Survey, flowed 235 barrels distillate and 8.3 million from Devonian sand, 6691-6880 feet, 20/64-inch, 67.8-gravity, completed 6-31-53, TD 6880.

UTAH—NEW GAS FIELDS

Carbon County. El Paso Natural Gas Co.'s Peters Point Unit 2, SE NW NW 36-12s-16e, flowed 2.1 million from Wasatch sand, Eocene 2780-3231 feet, completed 7-1-53, TD 4984.

Unnamed field. Equity Oil Co.'s Gov't.-Mounds 3, SW SW 18-15s-12e, flowed 16.5 million (Carbon Dioxide) from Conconino sand, Permian 4903-5254 feet, completed 7-28-53, TD 5254.

Emery County. Three States Natural Gas Co.'s M. D. Kearns 1, NW NE 27-16s-6e, flowed 7.0 million from Dakota sand, Lower Cretaceous 7006-46 feet, completed 7-18-53, TD 7046.

WYOMING—NEW OIL FIELDS

Carbon County, Bow area. Trigood Oil Co.'s Baker 1-A, SW NW NE 26-21n-78w, flowed 225 barrels from 2nd Sundance sand, Jurassic 6900-48 feet, ¼-inch, completed 7-28-53, TD 7125.

Park County, Ralston area. Sun's State 1, NE NW 16-56n-101w, flowed 200 barrels from 3rd Frontier sand, Upper Cretaceous 10,117-135 feet, ¼-inch, 48.9-gravity, completed 9-7-53, TD 11,240.

Weston County. Taylor Oil Co.'s Fee 1, SW SW NW 14-42n-66w, flowed 700 barrels from Newcastle sand, Upper Cretaceous 7021-66 feet, 11/64-inch, completed 7-27-53, TD 7105.

Unnamed field. Taylor Oil Co.'s Gov't-Stringer 1, NE NE SE 15-42n-66w, flowed 193 barrels from Newcastle sand, Upper Cretaceous 7085-7124 feet, 15/64 inch, completed 7-10-53, TD 7124.

WYOMING—NEW OIL PAY

Weston County, Clareton field. The Texas Co.'s T. R. Elliott 2, SE SW 1-43n-65w, flowed 432 barrels from Muddy sand, Upper Cretaceous 5835-42 feet, 13/64-inch, completed 7-31-53, TD 5885.

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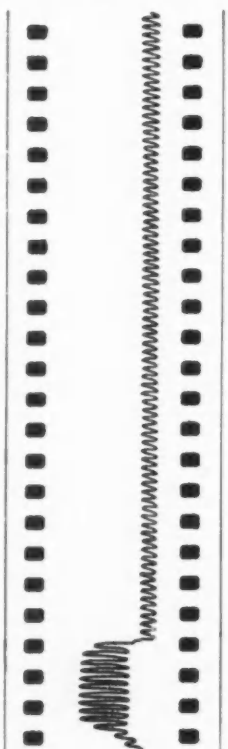

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Aeration of Drilling Fluids

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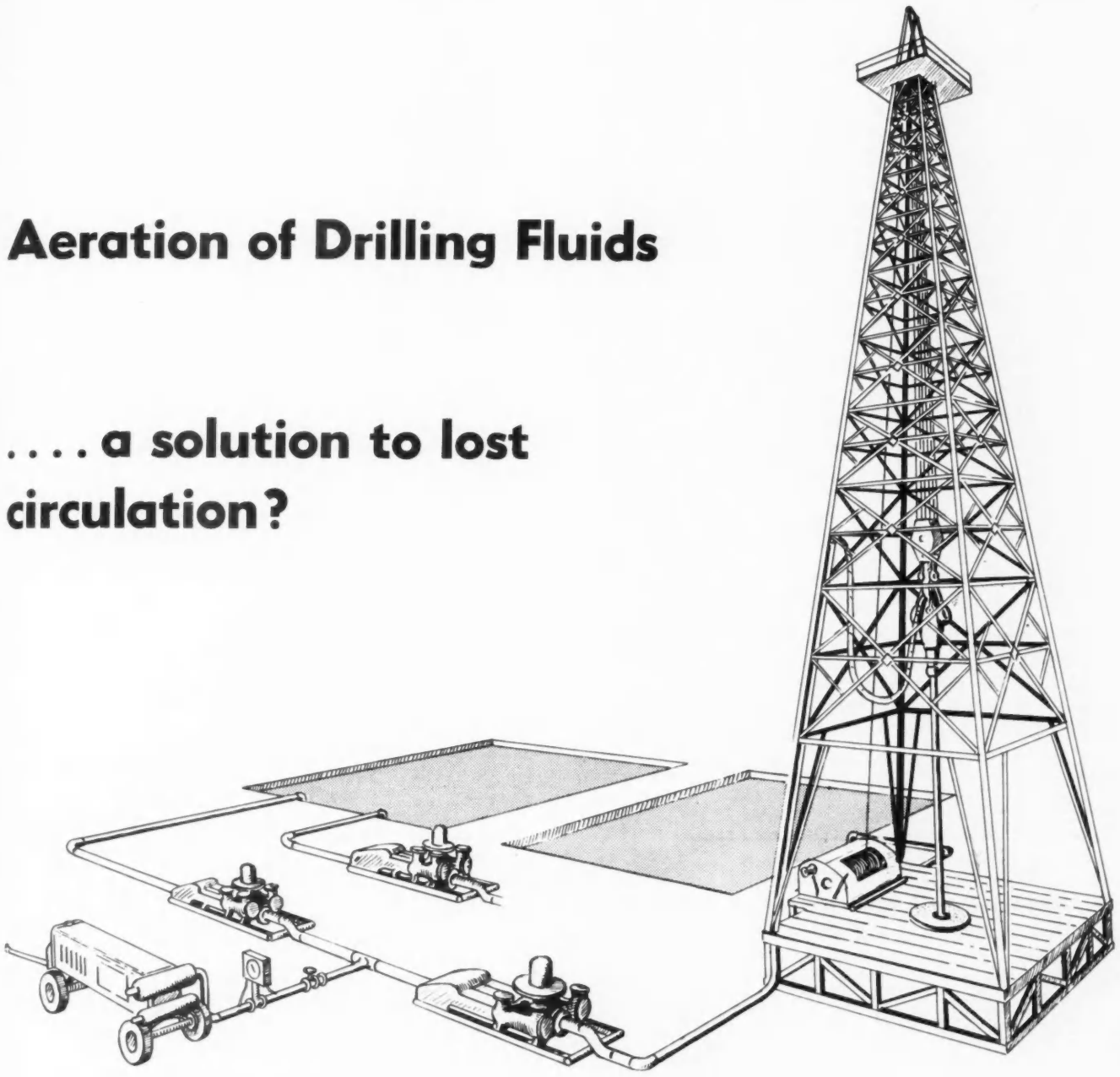


- The slush pump as a combination air compressor and mud pump has potentialities.
- Here's how Phillips Petroleum Company has made it work.

By ROY A. BOBO and H. M. (BILL) BARRETT,
Phillips Petroleum Company

RECENT USE of air-mud mixtures in overcoming lost circulation problems has been successfully applied by Phillips Petroleum Company in its Huntington 1 in Emery County, Utah. Work carried on by this company reveals that introduction of air-mud mixtures in the drill pipe to reduce the density of the annular mud column has promising possibilities.

- This procedure can be used on wells where lost circulation is a problem.
- Air can be successfully added to a drilling fluid by using two standard mud pumps and a standard portable air compressor.

Purpose. Lost circulation is one of the greatest causes of lost time, and, consequently, is one of the major cost contributing factors in the industry today. Though loss of circulation is brought about by many things, depending upon the type and nature of the formations where such loss occurs, it can be tied in almost universally

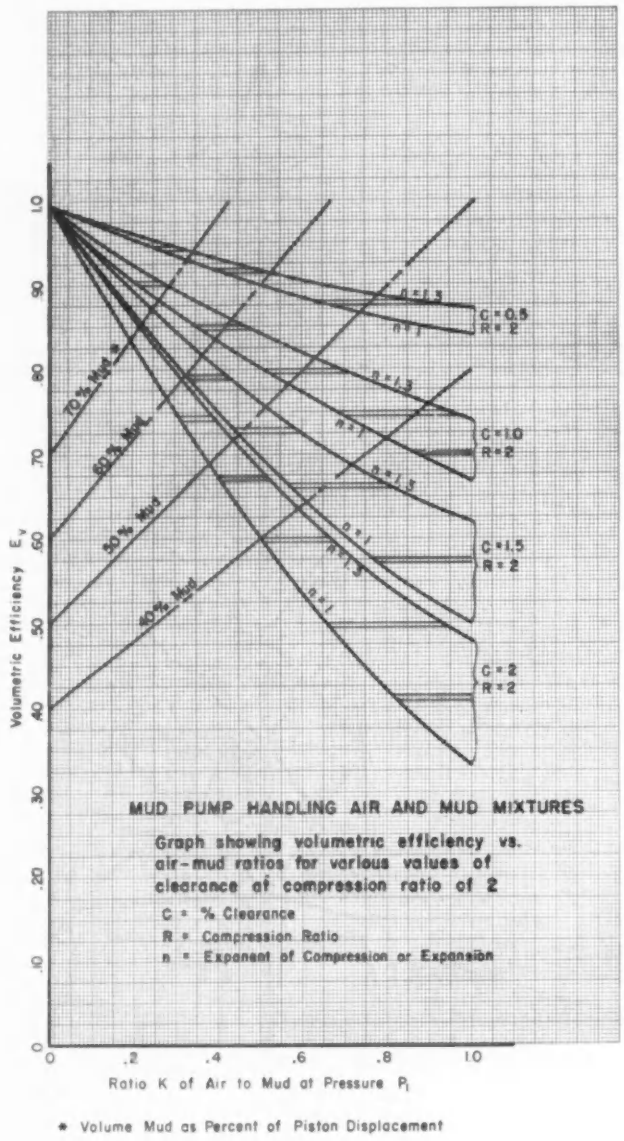

MUD PUMP HANDLING AIR AND MUD MIXTURES
Graph showing volumetric efficiency vs. air-mud ratios for various values of clearance of compression ratio of 2
C = % Clearance
R = Compression Ratio
n = Exponent of Compression or Expansion
Volumetric Efficiency E_v
Ratio K of Air to Mud at Pressure P_1
70% Mud*
60% Mud
50% Mud
40% Mud
C=0.5 R=2
C=1.0 R=2
C=1.5 R=2
C=2 R=2
n=1.3
n=1
* Volume Mud as Percent of Piston Displacement

FIGURE 1

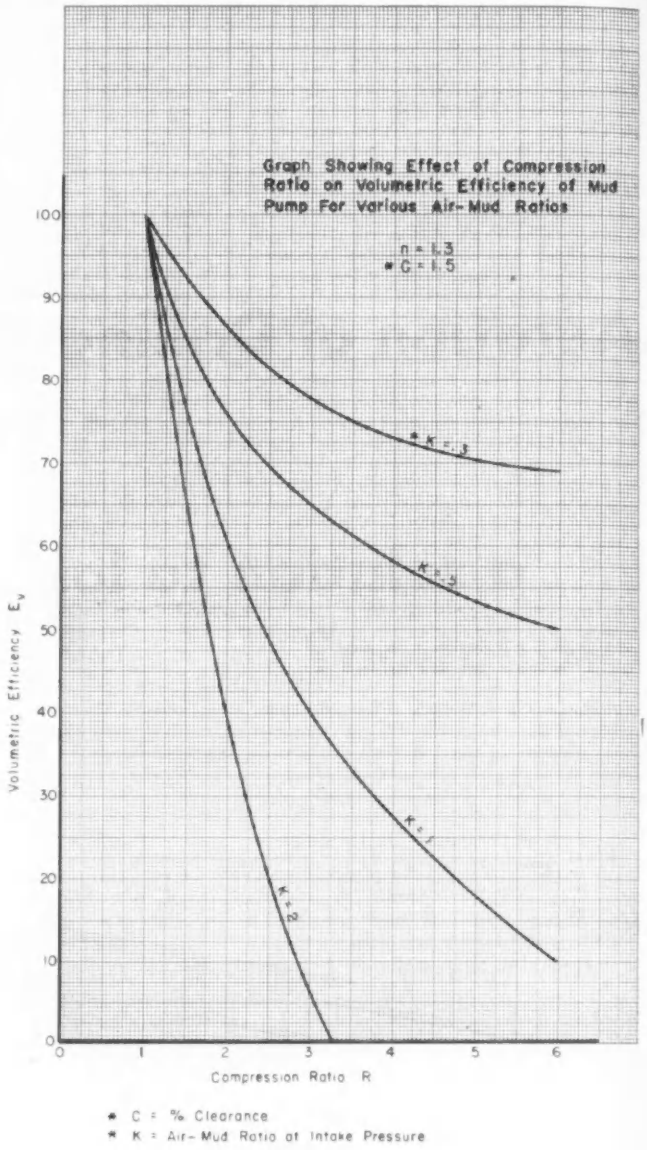

Graph Showing Effect of Compression Ratio on Volumetric Efficiency of Mud Pump For Various Air-Mud Ratios
n = 1.3
* C = 1.5
* K = 3
K = 2
K = 1
K = ½
Volumetric Efficiency E_v
Compression Ratio R
* C = % Clearance
* K = Air-Mud Ratio at Intake Pressure

FIGURE 2

with density and character of the drilling fluids used.

Water base muds have been used widely and are hard to replace, except in special cases, because water is usually the cheapest liquid available that can be made into an acceptable drilling fluid. It is converted into a drilling mud by the addition of certain solid materials that impart to the water-solids system necessary properties which are controlled within confined limits.

One of these properties is weight. Water itself weighs 8.3 pounds per gallon and the solids ordinarily added to make a drilling fluid having higher specific gravity increase this weight; hence, a drilling mud consisting only of water and bentonite and having average carrying and sealing properties will weigh from 8.6 pounds to 8.8 pounds per gallon.

To lighten such a mud, materials of lesser density must be added. Oil has been applied as an effective weight reducer for water base muds. Probably the greatest demonstration of this use was in the Spraberry wells drilled in West Texas. Mud weights in the Spraberry wells were maintained dangerously high by contamination with salt, but control was established by adding 30 to 40 percent crude oil to the drilling fluid. The resulting weight reduction held to a minimum losses of drilling fluid to the formations.

Air is one material—both abundant and cheap—which will reduce drilling mud weight in weak or fractured formations. As a weight reducer, its benefits have not been recognized because of the difficulties of adding it to the mud and then of handling it once added. To leave air in the mud is impractical and ineffective. To introduce the air in sufficient quantity at the standpipe where hole pressures are high requires a very large, expensive and relatively non-portable compressor.

One West Texas service company's experiments showed that air could be introduced into a mud stream under pressures obtainable by standard, low cost portable air compressors. This air injection method requires two mud pumps compounded. Air from an adequate standard portable compressor is introduced between the two pumps.

Theoretical Considerations. A theoretical study of the method was conducted to analyze slush pump performance when serving the dual function of pumping mud and compressing air. Formulae are developed (see appendix, equations 4, 5 and 6) from which the total delivered volume, as well as the individual volumes of mud and air, can be readily ascertained for any condition. Plots of these data are given in Figures 1 and 2.

The following observations may be made from Figure 1:

1. Clearance ratio has a decided effect on volumetric efficiency of the pump. It follows, therefore, that all unnecessary clearance should be eliminated. Since few standard mud pumps have clearances which can be reduced as low as 1.5 (times piston displacement), this factor is a serious drawback. Need therefore exists for a completely redesigned mud pump having a clearance of 50% of piston displacement or less. This would contrast with 153 percent to 280 percent clearance in present day pumps.
2. In order to obtain the lowest possible return column mud densities, the quantity of mud delivered to the second pump should be kept as low as possible and still remove the cuttings from the hole. For example, a pump with clearance ratio of 1.5 accepting mud at 70 percent of its piston displacement, will operate at an air-mud ratio of about 0.23 to 1 based on intake pressure, P_1; however, if the mud volume is cut to 40 percent of the pump's piston displacement, it will deliver at an air-mud ratio of 0.65 to 1 under the same conditions.

Figure 2 shows that the volumetric efficiency decreases drastically with increases in compression ratio (increase in pump discharge pressure for a fixed intake pressure) at large air-mud ratios. As would be expected, the effect is not so pronounced at lower proportions of air to mud.

From this it may be deduced that the intake pressure to the second mud pump should be maintained at as high a value as possible with the compression equipment used. For example, a pump having 200 percent clearance with 40 percent of its displacement being mud and discharging at 265 pounds per square inch gauge will deliver over four times as much air at 125 psig intake pressure as at 40 psig.

Figure 3, prepared by F. H. Poettmann, of Phillips Petroleum Company's Production Research Department shows the reduction in annular mud column density which will result from introduction of various volumes of air at various depths. These curves may be used with actual air-mud ratios to determine the effectiveness of the method being used.

About the Authors

ROY A. BOBO, director of the Drilling Engineering Division of Phillips Petroleum Company's Production Department obtained a B.S. degree in Electrical Engineering from Oklahoma A. & M. College in 1936.

He joined Phillips upon graduation and has since served in various engineering and operational capacities. From 1944 to 1952, he was assistant regional superintendent in Houston. In May, 1952, he became head of the company's newly created Drilling Engineering Division, in which he is now active.

HERBERT M. BARRETT received his A.B. degree from Baylor University in 1933 having geology as a major study and chemistry as a minor. He received his M.A. degree in 1939 with a major in chemistry. While at Baylor, he lettered in football and track. He taught school in East Texas between 1934 and 1936. In 1936, he worked for National Supply Company in the Arp and Kilgore, Texas, stores. Later, he was a field salesman for National in the East Texas field.

In 1941, he worked for Baroid Sales Division of National Lead Company as a well logger. In 1946, he joined Phillips Petroleum Company as assistant chief mud engineer. In the fall of 1946, he was elevated to chief mud engineer, the job he now holds.

Field Application of Method. Initial trial of this method by Phillips was in a well drilled in Emery County, Utah. Extreme loss of circulation had been experienced in this well.

The well was shallow (3300 feet). A 13⅜-inch surface casing string had been set at 604 feet. The formations were hard, dense and fractured. When drilling in a fractured section, the bit would run rough and then the circulation would be lost. Considerable lost circulation material had been added to the mud and a large percentage of the drilling had been done with only partial returns. At times, complete returns were lost and the hole would not stand full. At about 1600 feet, the hole was cemented successfully. Drilling ahead, new fractured formations were drilled; however, new losses occurred. These circumstances indicated that the use of air to lighten the mud column would prove beneficial. Equipment used on this well was as follows:

1. MUD PUMPS—The rig employed two pumps, one of 18-inch and the other of 16-inch stroke. The 18-inch pump was fitted with 7¾-inch liners, so manifolded that the discharge line from the 16-inch pump could be connected to it. A 2-inch line was connected to the manifold so that air could be injected in the system at this point. The 18-inch pumped the mud and air mixture down the hole. This pump was fed mud from the 16-inch pump and air from an industrial compressor.
2. AIR COMPRESSOR—A 500 cubic feet per minute air-compressor was connected to the 18-inch pump manifold through 2-inch line pipe. The compressor was an 8¾-inch by 4¾-inch by 5-inch standard machine rated at 1000 revolutions per minute.
3. MUD TANKS—Three standard size steel mud tanks were used on this job. The dimensions of these tanks were approximately 30 x 8 x 6 feet deep and were connected with 8⅝-inch casing flow lines. Mud coming out of the hole was frothy—consequently its volume was considerably greater than could be handled by the 8⅝-inch flow lines. These small inadequate flow lines were replaced by lines made of 10¾-inch casing.
4. SHALE SHAKER—Use of a standard vibrating type shale shaker was temporarily discontinued and the mud bypassed when air was used

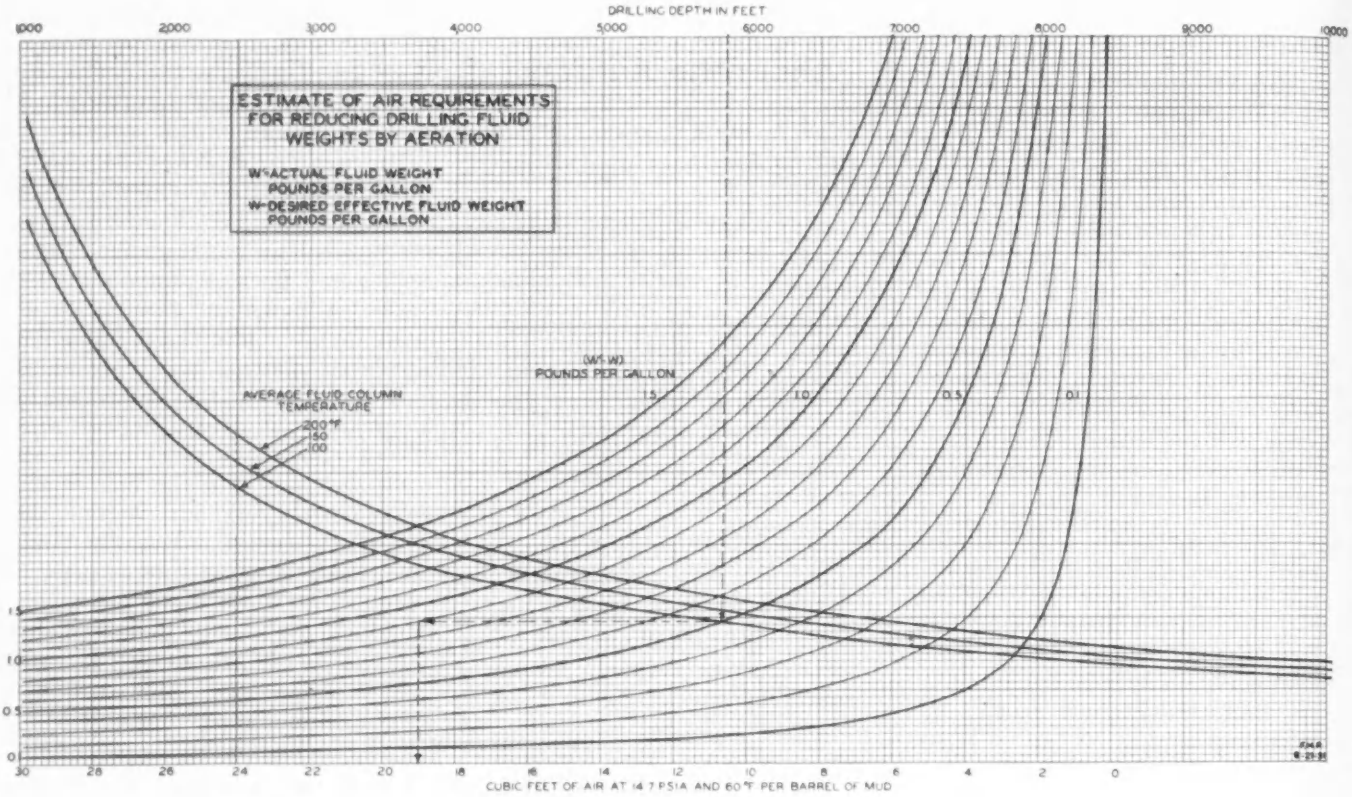


FIGURE 3

in the mud. This was made necessary by the rapidity with which the air-mud mixture came out of the flow line. When an attempt was made to use the shale shaker, the mud, traveling too fast, would go across and beyond the screen. This was remedied by increasing the mud box on the shale shaker and inserting a baffle.

5. CELLAR—An average size cellar was used on this location. Due to the difficulty of adjusting the air and mud mixture, mud bubbled over the short flow nipple, filling the cellar a part of the time. Mud overflowing the cellar accumulated in a shallow reserve pit below the rig, where it was transferred back to the pits with a yellowdog pump.
6. MUD MIXING—With both mud pumps used to circulate the air-mud mixture, none was available for mixing new mud. Eventually, a small standby mud pump was placed in service. This solved the mud mixing problem.
7. JET SUBS—On the initial trial so-called jet subs were used to by-pass part of the air and mud mixture before it reached the bit.

The principle contribution which will be made by any valve placed in the string off bottom, will be in cases where circulation is being lost at or near the bottom of the hole. In such a case, it is conceivable that when the air-mud mixture reaches bottom, the air will be so compressed it occupies practically no space at all and the drilling mud being pumped may go out into the fractured zone near bottom with the air failing to travel up the annulus where it can expand and do some good.

Variation in quantity of air injected was made in two ways. The first was to vary the speed of the small or first pump while holding that of the second constant. The second method was to control the pressure at which the air was introduced between the pumps.

How To Start Equipment. Some trouble was experienced in starting these pieces of equipment in their proper sequence. The method adopted was to start the smaller pump first and let it pump through the larger until it also was started. After the larger reached its proper speed, the compressor was turned into the system. Once circulation was established and the air mixture again reached the surface, the percent of air being mixed with the mud was reduced.

Field Results. The air-mud mixture upon reaching the surface would expand greatly causing some of the mud to go over the flow nipple into the cellar. This was partially corrected by putting a worn out wiper rubber under the rotary drive bushings. Later, a steel plate was made to fit around the kelly and rested upon the top of the flow nipple. This forced most of the air-mud mixture out of the flow line into the pits. Some type of drilling head would have been quite useful. The mud consisted of bentonite and water only and weighed 8.6 pounds per gallon. Its viscosity varied from 38 to 50 seconds. As this mud flowed through the three mud pits, the air broke out very readily. The mud and the suction pits were almost completely free from air so that it was easily picked up by the smaller pump. No chemical treatment was used, but corrosion may be a problem.

It was found better to keep lost circulation materials in the mud when

using air. Even though a less dense mud column insures circulation, there still remain cracks, crevasses and fissures which must be filled with something to make them support even a lightened air and mud mixture. The ultimate goal of this procedure must always be to condition the hole so that eventually it will support a column of pure mud.

Using Poettmann's graph, Figure 3, Table 1 has been prepared to show the reduction in return annulus column densities that occurred under various pumping rates with inlet pressure to the second pump of 120 pounds per square inch absolute and discharge pressure of 240 psia. The method proved to be quite effective in restoring circulation to the hole. Such fluid level usually stood statically from 300 to 600 feet from the surface.

Future Outlook. The future outlook for such equipment appears promising as a remedy for loss of circulation. An operator in trouble with lost circulation will try any and all material in the hope of gaining relief. As a result, the industry has tried about everything in the way of bridging and sealing agents that are currently known, including many waste by-products. With this as a background, the use of air has good potentialities.

With further improvement in technique, the compounded mud pump-portable compressor installation should appear even better. It is to be hoped that the manufacturer will assist by supplying the industry with a low clearance mud pump. With such, introduction of far greater volumes of air at increased depths will be possible, and the range of application of the method herein described will be extended.

—The End

ACKNOWLEDGMENT

Acknowledgment is made for the assistance of the following Phillips Petroleum Company personnel: G. S. Ormsby of the Drilling Engineering Division for furnishing a check derivation of the formulae shown herein; J. P. Stephens and his Drilling Tools Division personnel, for assistance in conducting the experimental work described.

TABLE 1

Second Pump—7¾" x 18"		First Pump—6" x 16"		Percent Mud*	K @ 120 psia.	Air-Mud Ratio†	Reduction in Density in Pounds/gallon
SPM	CFM	SPM	CFM				
50	97.3	50	49.6	51.0	.39	17.9	1.3
50	97.3	55	54.6	56.0	.34	15.6	1.12
50	97.3	60	59.5	61.3	.28	12.8	.85
50	97.3	65	64.5	66.3	.24	11.0	.80

* Volume of mud as percent of piston displacement—second pump.
† At 14.7 psi.

APPENDIX

Derivation-Formula for determining volumetric efficiency of mud pump for various mixtures of mud and air with intake pressure P_1 and discharge pressure P_2.

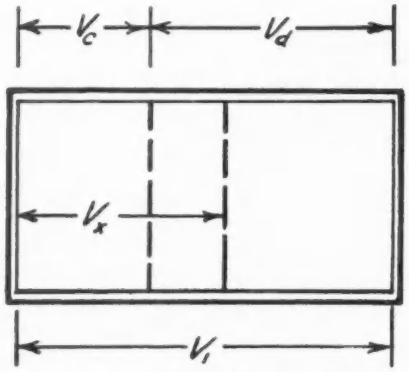
V_c — Clearance volume

V_d — Displacement volume

V_a — Volume of air drawn into cylinder at intake pressure P_1

V_m — Volume of mud ditto

$K = \frac{V_a}{V_m}$



At end of compression stroke, volume of air V_a' left in clearance pocket V_c

$$= \frac{P_1^{1/n}V_a}{P_2^{1/n}} \frac{V_c}{\left[\frac{P_1^{1/n}}{P_2^{1/n}} V_a + V_m\right]} = \frac{P_1^{1/n}V_aV_c}{P_1^{1/n}V_a + P_2^{1/n}V_m}$$

During intake stroke, air left in clearance pocket expands to volume V_x before P_1 is again reached. This also includes mud volume V_m' left in clearance pocket. Then

(1) $P_2^{1/n}V_a' = P_1^{1/n}(V_x - V_m')$ where V_m' is the volume of mud left in clearance pocket at end of compression.

$$V_m' = \frac{V_m \cdot V_c}{V_m + \frac{P_1^{1/n}V_a}{P_2^{1/n}}} = \frac{P_2^{1/n}V_m \cdot V_c}{P_2^{1/n}V_m + P_1^{1/n}V_a}$$

(2) From (1)

$$\frac{P_2^{1/n}P_1^{1/n}V_aV_c}{P_1^{1/n}V_a + P_2^{1/n}V_m} = P_1^{1/n}\left[V_x - \frac{P_2^{1/n}V_mV_c}{P_2^{1/n}V_m + P_1^{1/n}V_a}\right]$$

Whence

$$V_x = \frac{P_2^{1/n}V_aV_c}{P_1^{1/n}V_a + P_2^{1/n}V_m} + \frac{V_mV_cP_2^{1/n}}{P_2^{1/n}V_m + P_1^{1/n}V_a}$$

$$(3) = P_2^{1/n}V_c\left[\frac{V_a + V_m}{P_1^{1/n}V_a + P_2^{1/n}V_m}\right]$$

$$\text{Let } K = \frac{V_a}{V_m}; \text{ then } V_x = P_2^{1/n}V_c \frac{V_a + \frac{V_a}{K}}{P_1^{1/n}V_a + P_2^{1/n}\frac{V_a}{K}}$$

$$V_1 = P_2^{1/n}V_c\left[\frac{1+K}{KP_1^{1/n} + P_2^{1/n}}\right] + V_a \frac{1+K}{K}$$

$$V_a = V_1 \frac{K}{1+K} - \frac{KP_2^{1/n}V_c}{KP_1^{1/n} + P_2^{1/n}}$$

But $V_1 = V_d + V_c$: $EC = \frac{V_c}{V_d}$; $V_1 = V_d + CV_d = V_d(1+C)$

$$\text{Hence } V_a = V_d \frac{(1+C)K}{1+K} - \frac{KP_2^{1/n}(V_d)(C)}{KP_1^{1/n} + P_2^{1/n}}$$

$$\frac{V_a}{V_d} = \frac{K(1+C)}{1+K} - \frac{KP_2^{1/n}(C)}{KP_1^{1/n} + P_2^{1/n}}$$

$$(4) \quad \frac{V_a}{V_d} = \frac{K(1+C)}{1+K} - \frac{KR^{1/n}C}{K + R^{1/n}}$$

$$\frac{V_a}{V_m} = K \text{ or } V_m = \frac{V_a}{K}$$

$$(5) \quad \frac{V_m}{V_d} = \frac{1+C}{1+K} - \frac{R^{1/n}C}{K + R^{1/n}}$$

Adding and simplifying,

(6) Volumetric efficiency

$$E_v = \frac{V_a + V_m}{V_d} = 1 - \frac{KC(R^{1/n} - 1)}{K + R^{1/n}}$$

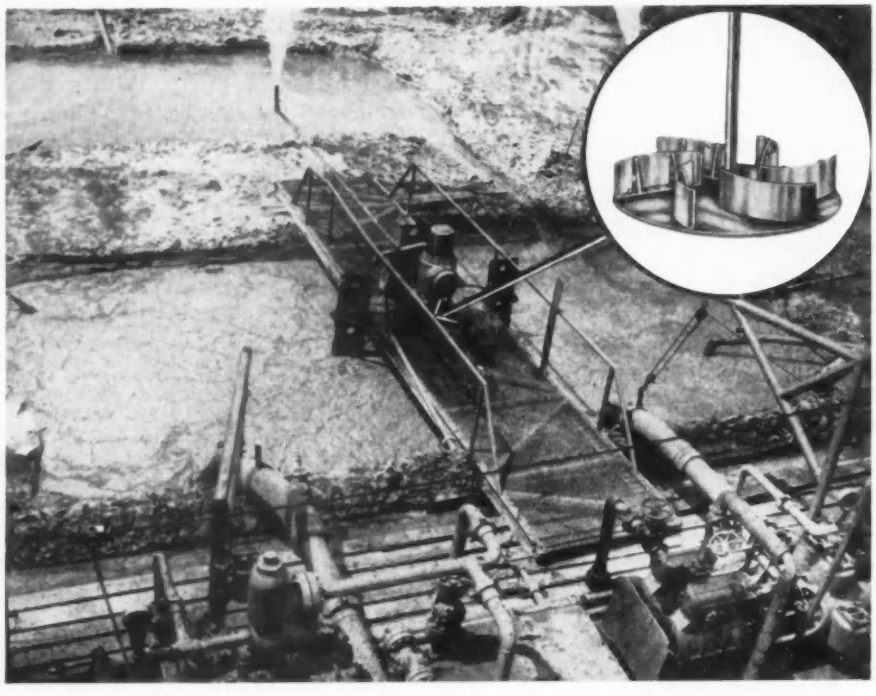


Fig. 1—Mixers installed in earthen pits result in homogenous drilling fluid and savings for the contractor. A 25-horsepower mixer equipped with a 48-inch diameter curved lifter-type turbine blade is shown operating on a 20 x 40-foot mixing pit. Turbine is shown in insert.

Fluid Mixers Being Used To Mix Drilling Mud

. . . a new development in the Gulf Coast area, they provide a maximum mud inventory at all times and allow quick changes of weight and viscosity.

By J. Y. OLDSHUE, Mixing Equipment Co., Rochester, N. Y.

THE USE OF fluid mixers is a new development in mixing drilling mud. The advantages of having a maximum mud inventory ready at all times and being able to change mud weight and viscosity quickly has meant substantial savings to the operators of the more than fifty installations in the Gulf Coast Area. In addition, further savings have been realized from lowered mud pump maintenance and better and easier utilization of weight material, gel and chemicals.

Fluid mixers are used in drilling mud operations for three basic functions:

- Suspension of solids in the mixing pits.
- Addition of weight and gel material to the mud system.
- Dissolving of chemical reagents for addition to the mud system.

The fluid mixing equipment used for these operations are a turbine mixer, a flash mixer and a portable mixer.

A turbine mixer equipped with slow speed, turbine type impellers for suspension of drilling mud.

The turbine mixer provides a constant over-all flow in the mud storage tank, giving a uniform mud at all levels of operation and preventing settling of weight material or floating of gel. The entire mud inventory is thus ready for immediate use.

A typical installation is shown in Figure 1, which uses a 25 horsepower turbine type mixer on a 20 by 40 by 6-foot earthen pit. The impeller is 48 inches in diameter, of the type shown in insert, and will pump more than 10,000 gallons per minute at 68 revolutions per minute.

Turbine mixers require only a small amount of power, from 5 to 25 installed horsepower for normal tank installations, depending upon tank volume and mud weight.

Maintenance costs due to abrasion are negligible since the only parts operating in the mud are the slow speed impellers, running at speeds from 56 to 68 RPM. Further, the stand-by mud pump previously used for mud mixing is always available for use at full capacity on the well.

The mixing tanks have complete and uniform suspension and appreciable settling of mud in the ends and corners of tanks is eliminated. Availability of the complete mud inventory for use permits reduction in the amount of mud that must be held in surface storage.

A flash mixer operating in an auxiliary tank (Figure 2) is a high-speed mixer with special propellers (see insert Figure 2) for addition of weight and gel material.

A mud return line from the well flows through the auxiliary tank, and in one pass, gel and weight material are completely dispersed and wetted, ready for immediate use without any soaking period. Bentonite clay addition rates as high as 200 pounds per minute are possible in this flash mixer.

There is no practical limit on the rate in which weight material can be added through the flash mixer. The addition of 3500 pounds of weight material has been carried out in less than six minutes under production conditions. Requirements to heavy up the mud quickly can be met practically as fast as it is possible to cut and dump the bags of material.

Complete gel wetting at high rates (200 pounds per minute) possible, results in the more effective use of the gel, since it is at full strength in such a short time. Less gel waste occurs and rapid changes in mud viscosity can be made.

A portable mixer operating in a 50 to 75-gallon tank dissolving chemicals.

The solution is made up to the desired strength and fed to the mud system at the right flow rate through

COMPLETELY PORTABLE

ABSOLUTELY NEW!

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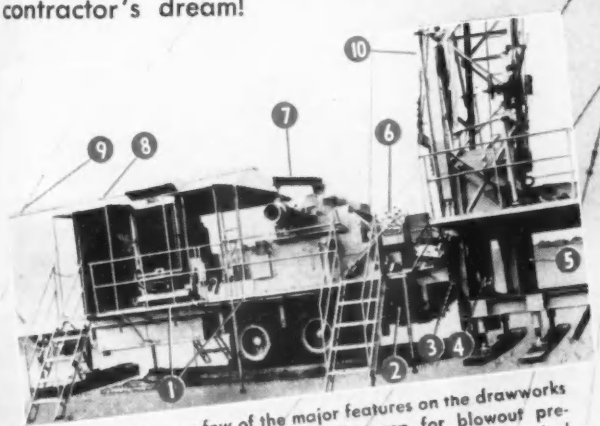
Double-Trailer Single Engine GIANT RIG!

Yes, this is the most COMPLETE, PORTABLE RIG — to our knowledge — ever built and put on the job! Look at what has been done to make it MORE PORTABLE — MORE COMPLETE. The entire rig is compacted into 2 trailers — one trailer containing drawworks and toolhouse — the other the mast and rotary table — both of which can be driven right up to location and RIGGED UP IN 2 HOURS, or less! The entire weight of each trailer is under 65,000 pounds gross and within the 10 foot road width. For shallow drilling, it's tops! For workover, it's revolutionary! For a real money-maker, this rig is a contractor's dream!

Here are main features on mast trailer: (1) Hinged bearing jacks; (2) Folding outer sections for working floor; (3) Pipe rods, beams, and beam slots; (4) Head frame for supporting mast; (5) Walkway; (6) Light standards; (7) Fixed rotary table; (8) Stationary front hinge and pins for supporting mast; (9) Removable back pins used when raising or lowering mast; and (10) Drawworks trailer.



Pointed out are a few of the major features on the drawworks trailer: (1) folding walkways; (2) pump for blowout preventers; (3) guide key for hooking trailers together; (4) swivel for mud line; (5) removable bolster beam and center support; (6) Full view control panel; (7) pivot arm for Cathead; (8) toolhouse; (9) guy ties on toolhouse; and (10) mast trailer.

RATED CAPACITY

5,000' with 4½" drill pipe
6,000' with 3½" drill pipe

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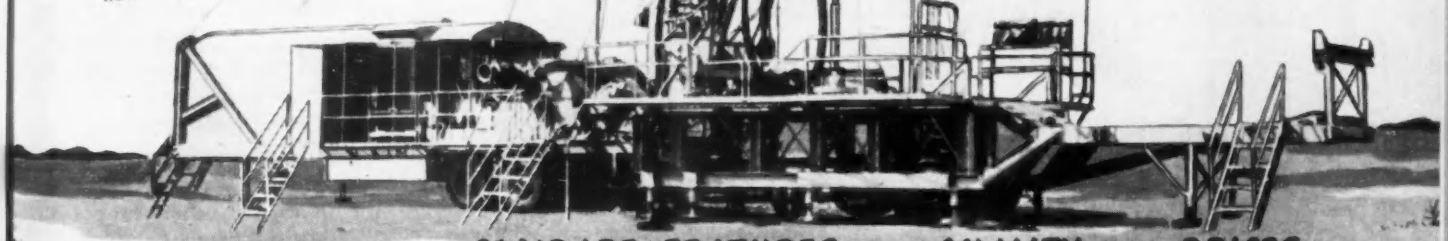
- ★ **Stationary rotary table (can be removed if need be)**
- ★ **Hinged screw jacks (Always in place)**
- ★ **Complete control of Rig by Driller at all times**
- ★ **Driller operates complete preventer system from his control panel position**
- ★ **Trailers keyed together for perfect alignment at well head or drilling site.**
- ★ **Weight buckets, tongs, and traveling block stay intact at all times during moving of rig.**



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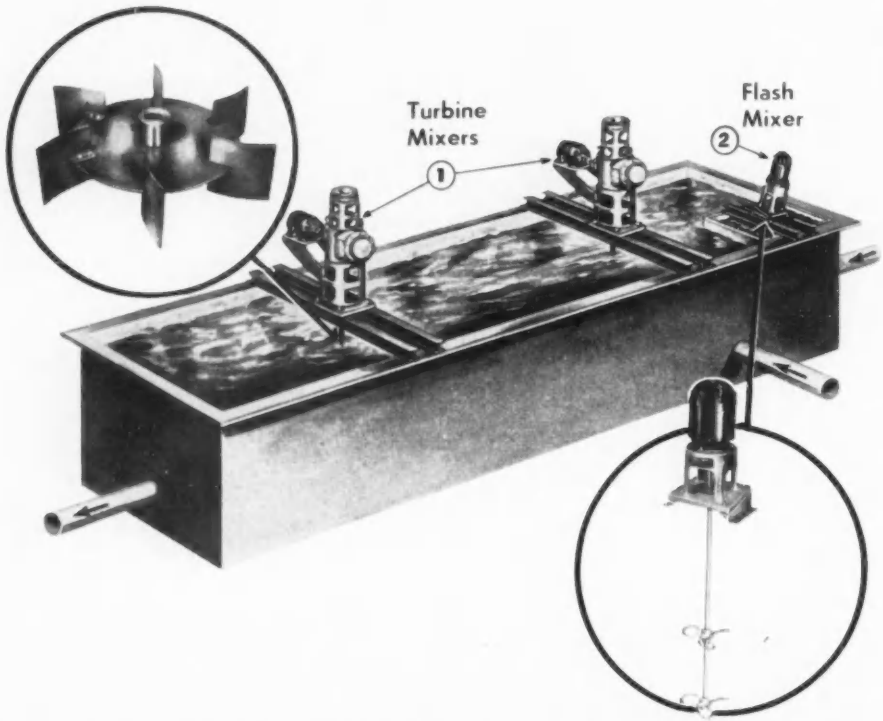

Fig. 2—Typical mixing tank equipped with two turbine mixers (1) for mud suspension and a flash mixer (2) for addition of ingredients. Inset at left is curved blade turbine used in steel tanks. Inset at right shows cut-out propellers of flash mixer used for addition of bentonite clay.

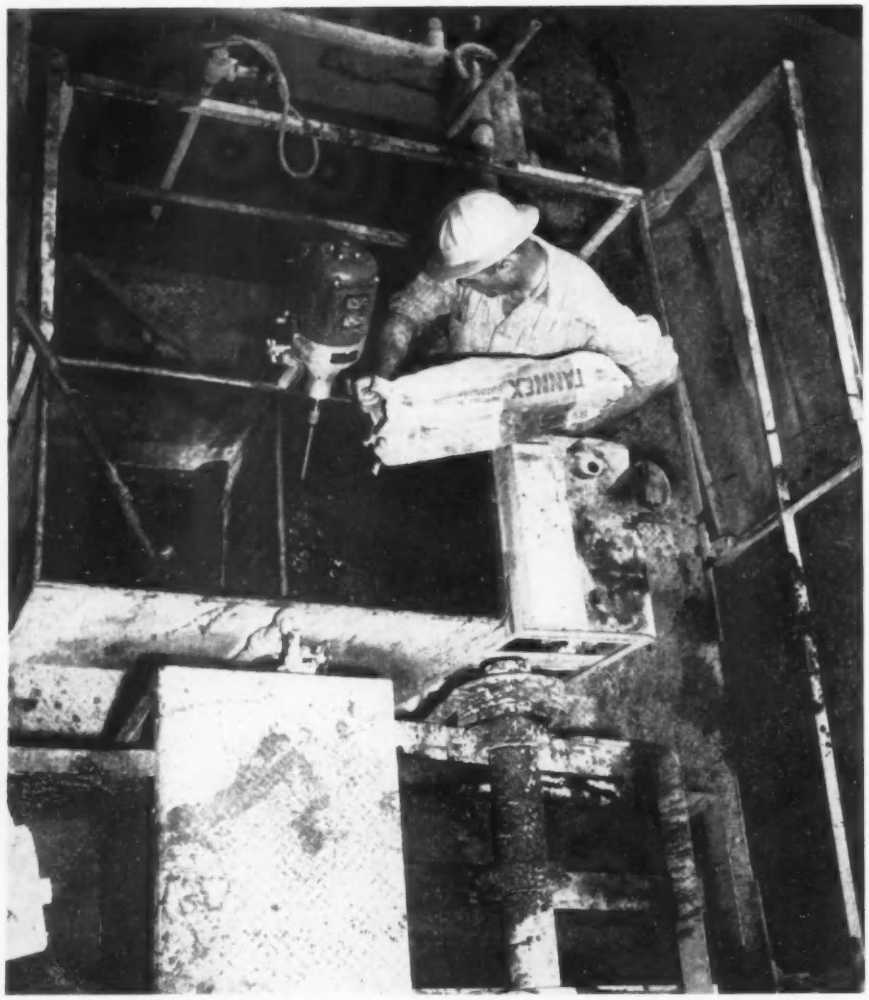

Fig. 3—Portable mixer rated at ⅓ horsepower is used for chemical mixing service.

a valve-controlled line. Figure 3 shows a typical installation.

Chemicals are dissolved rapidly and can then be added uniformly to the mud system with portable mixers, giving the maximum result from the chemicals used. The solution is fed continuously to the mud return line, with better uniformity of mud as a result.

Development. A complete series of laboratory and field tests were made to develop the mixers for the suspension and flash mixing operations. The equipment was developed on the basis of the type of mixing action required by each of the operations, pilot tested in the laboratory and then field tested on operating rigs. The requirement of the drilling industry for reliable, rugged equipment was given full attention at all stages of development.

Suspension in Mixing Tanks. Several laboratory and field tests were made to determine the most effective fluid regime in the tank for suspension of the solids. A fluid regime in a mixing vessel can be characterized by the quantity of fluid pumped by the impeller, and the velocity head within that fluid stream.

Laboratory data were obtained in a 24 by 48 by 10-inch mud-mixing tank. The degree of suspension was measured by determining the radius of deposition on the tank bottom. The apparatus was set up as a continuous flow, scale model of a typical drill rig. These tests gave the relationships between speed, diameter and horsepower for the impellers in terms of process results, and based on these, a test installation on a 15 by 18 by 6-foot tank was made.

The tank was on a drilling barge and was equipped with a turbine mixer using a 48-inch diameter turbine with variable speeds from 68 RPM to 0.

It was found that for impeller diameter [D] to tank width [T_w], ratios of 0.1 to 0.5, which are feasible in commercial practice, the suspension of drilling mud is affected primarily by the impeller pumping capacity and to a negligible degree by the specific velocities within the fluid stream. This does not hold for other ranges of D/T_w.

Large-diameter mixing impellers running at low speeds pump more

THE two Caterpillar D337 Oilfield Engines powering this 5,000 ft. rig replaced other make Diesels in operation only 14 months.

Foster Drilling Co., Cushing, Okla., found its operating costs soaring with the original power. Having been completely satisfied by the performance of two Cat* D13000 Diesels on another rig, the company repowered with D337s. Drilling depth was increased, operating and fuel costs were decreased, and down time was held to a minimum.

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fluid with a lower velocity head than do small diameter impellers running at high speed at the same horsepower input. The slower the impeller speed, however, the larger must be the mixer drive to handle the increased torque.

The most economical mixer for a suspension operation is determined from the factors of (1) the cost of the lower power required with larger diameter, slow speed impellers, (2) the increased cost of a mixer drive operating at a low speed, and (3) the cost of installing the drive.

On earthern pits, it is necessary to use a curved blade lifter turbine, shown in Figure 1, which prevents flow from the bottom side of the turbine, thus preventing erosion of the earthern pit due to the suction action of the turbine. The impellers have curved blades to resist abrasion in the solids suspension slurry. The low coverage in these mixing tanks, from 4 to 6 feet, makes it imperative to bring the impeller close to the tank bottom, usually within 2 or 3 inches.

Due to the comparatively shallow liquid levels, baffles or their equivalent are required to prevent vortexing. Figure 1, shows a typical baffle arrangement.

For steel tanks, a standard curved blade disc turbine (see insert Figure 2) is used.

In rectangular tanks whose lengths exceed twice the width, it is necessary to use two mixers per tank. A common land tank which is 8 feet wide by 32 feet long and 6 feet deep, falls in this category.

Complete suspension throughout the entire tank is obtained by using turbine type fluid mixers.

The power requirements are related to the size of the vessel and the mud weight. For normal size mud mixing tanks, ranging from steel land tanks up to earthern pits, the power required on an impeller type mixer is from 5 to 25 HP.

Negligible maintenance is involved on these fluid mixers. The impellers run at low speeds from 56 to 68 RPM and are the only parts subject to abrasion.

Addition of Ingredients. The addition of drilling mud ingredients is an extremely important phase of drilling operations. The rapid and intimate dispersion of ingredients throughout the vessel affects the performance of the entire mud system, as well as the amount of reagents required.

It was found that the mixing requirements for effective dispersion of ingredients are the reverse of requirements for solid suspension. It is necessary to use a mixer with a high velocity head in the fluid stream, which in turn generates a high degree of fluid shear, accompanied by a comparatively low impeller pumping capacity. The turbine used for solid suspension will not effectively handle the addition of gel and weight material.

The use of an auxiliary tank immersed in the main mud tank with provision for return flow from the well to pass in the top and out the bottom, enables gel and weight material to be dispersed in one pass. The auxiliary tank makes possible the application of a very intense dispersion action at low total horsepower.

Preliminary laboratory work carried out on a batch basis indicated that a tank volume of 200 to 300 gallons is required to give sufficient retension time for continuous dispersion in one pass of the stream from the well. It is further shown in these tests that a cut-out propeller gave the optimum results over the widest range of impeller diameter to tank width ratios, compared to several other impellers tested, and it was chosen for the application. The insert at the right in Figure 2 illustrates the cut-out propeller and a drive shaft used for the flash mixer.

A complete continuous scale model drilling rig setup was made with a mud tank 24 by 48 by 10 inches deep. The flash mixer tank in this setup was one gallon capacity, equipped with a 3-inch diameter cut-out propeller. The return mud from the well passed through the auxiliary tank, and out through an orifice at the bottom of the vessel. Agitation input and gel addition rates were varied to determine the minimum requirement to obtain complete dispersion at a given addition rate and the maximum practical addition rate.

Following these tests, a field test on a 15 by 18 by 6-foot mud tank equipped with a 5 by 3 by 3-foot auxiliary tank was conducted. Various speeds, diameters and horsepowers were used in both the laboratory and field tests.

Addition rates of 200 pounds per minute of bentonite clay are possible. The bentonite clay can be dumped into the tank a sack at a time.

Complete dispersion of this material in one pass through the flash mixer with a complete steady state viscosity obtained in the mud mixing tank within 20 to 30 minutes after the last clay addition. The time for complete system uniformity depends upon the flow rate through the entire system.

No limits on the rate of adding barium sulfate through the flash mixer, were found.

Ingredients such as lost circulation material, viscosity reducing agents, and other reagents are dispersed instantly through the entire mixing tank.

The power requirement for the flash mixer will depend upon the flow rate and mud weight, and is usually in the range of 3 to 5 HP.

Chemicals Mixing. Small amounts of chemicals that are readily soluble can be easily mixed in 50 to 75 gallon containers by a standard 1/3 HP portable mixer equipped with dual propellers. The solution can then be added to the mud stream as needed.

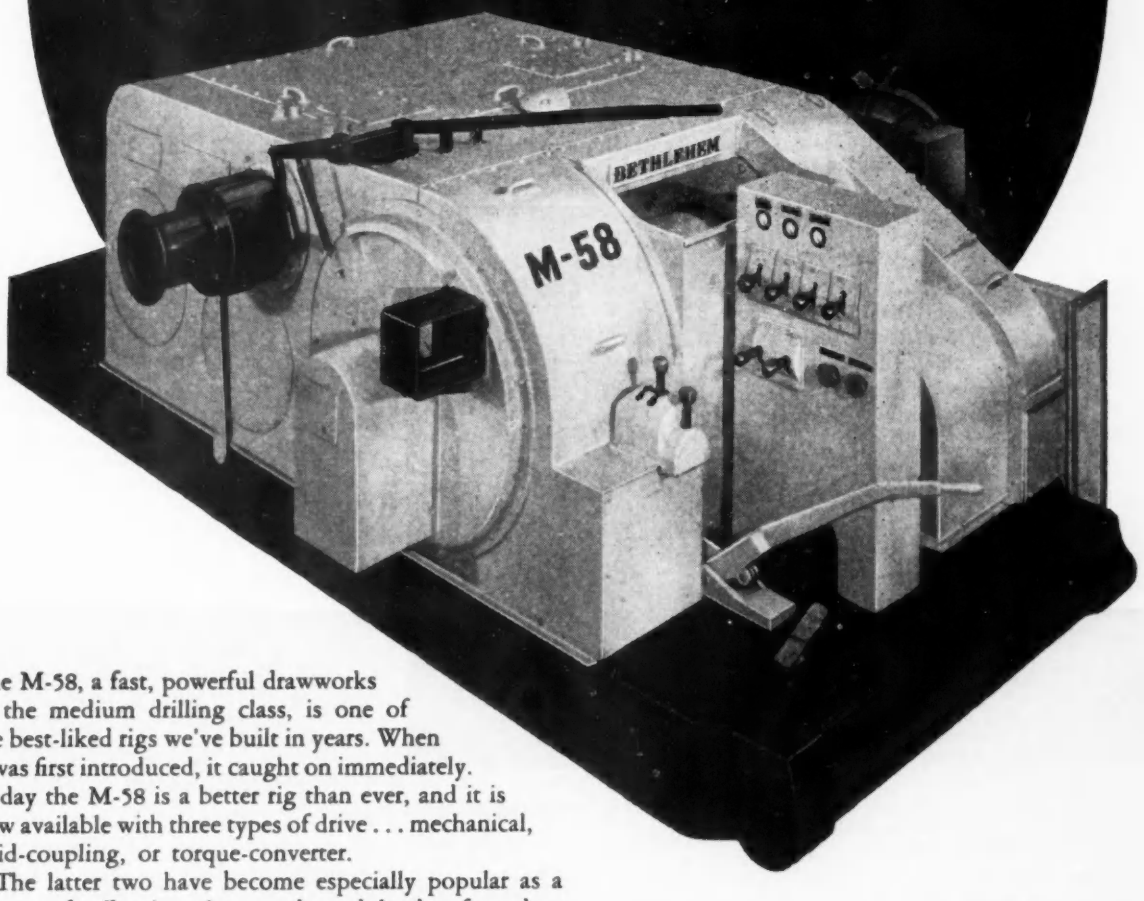
Summary. A slow-speed turbine mixer is found to be the most effective for drilling mud suspension. This mixer, however, cannot give effective dispersion upon addition of ingredients such as bentonite clay, barium sulfate, etc.

The addition of ingredients is accomplished by a high-speed flash mixer. The combination of the two mixers satisfies completely the requirements of the drilling mud operation. The important operating characteristics of these two mixers in a mud installation are:

- Complete suspension throughout the entire mud tank of all ingredients.
- Ingredients can be added rapidly and mixed intimately with the fluid. Bentonite clay can be added as fast at 200 pounds per minute, and will be completely dispersed throughout the mixing tank.
- For the normal range of drilling mud operations, the total power required is from 8 to 30 HP, depending upon the volume of tank and mud weight.—**The End**

Bethlehem M-58

Now Available with THREE *Types of Drive*



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The M-58 can be furnished with two- or three-engine drive and single or double pump drive. The engine compound is of sectionalized type so that the rig can be broken down into loads of required road width.

If you haven't yet seen the M-58, we recommend that you do so at your first opportunity. Phone or write us and we'll be glad to show you one of these units in action, where you can study its features.

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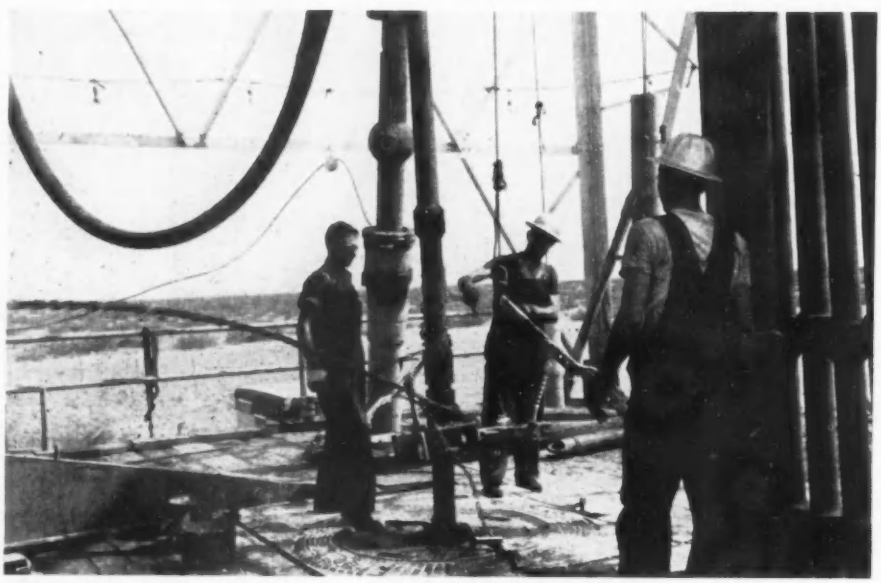

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Maintenance Means Money in Your Pocket

Here's a rundown on proper care of a drilling rig—from the drill pipe to the crown block.

By RALPH F. BLAIR, The National Supply Co., Cushing, Okla.

FEW MACHINERY units in industry are subjected to such severe and constant wear as the average drilling rig. Progressively deeper drilling has necessitated the use of heavier and, therefore, more expensive equipment. Today's drilling rig may cost anywhere from $150,000 to $1 million. This equipment must constantly be maintained if the operator is to avoid heavy financial loss or even stay in business.

The principal units of the average drilling rig that require constant attention and maintenance are:

- Pumps
- Swivels
- Engines
- Drawworks
- Drill pipe and tool joints
- Wire line
- Rotary hose

Pumps. Slush pumps account for more expensive down time than, perhaps, any other part of the rig, unless taken care of properly. The fluid ends of the pump give the most trouble. Fluid valves should be checked carefully after a well has been completed and before the rig is again put on location and constant attention should be given them during the entire drilling operation. This can be done when making a trip or when the pumps are shut down for other purposes. Valves and inserts should be replaced if they show any signs of cutting out, breaking, peeling or pitting. Inserts tend to absorb the shock of the valve coming down on the seat and prevent damage to the valve and seat. The life of both the valve and seat means keeping the inserts in good shape.

To lengthen the life of a piston rod, always be sure the piston is tight on the rod. Do not tighten the packing gland on the rod packing too much as the packing will score the rod, weakening it and causing failure. Be sure to have a good rod oiler to lubricate the rod, insuring longer rod life.

The fluid piston should be checked between wells and the cups replaced if they have begun to cut out as prolonged use of worn cups may mean replacing the whole piston. Always handle new pistons or piston cups with great care and lubricate them when being installed in the liner.

The liner should be checked between wells and taken out and lubricated if pump is to be idle for any length of time. When checking the liner, if it shows scoring, it should be replaced with a new liner, since a scored liner will cut up the new piston cups. Be sure to replace valve cap gaskets and cylinder head gaskets as often as needed, for gaskets are cheap compared to a valve cap or a cylinder head.

One rule should always be followed. If any trouble develops in a pump—

fix it immediately. Shutdown time is costly!

Swivels. The swivel is a very vital part of a rig, although as a rule it gives little trouble. The parts of the swivel to check are the wash pipe and wash pipe packing. These should be replaced whenever there is any wear. The wash pipe will last much longer if the packing nut is not tightened too much. When the packing nut is too tight it causes the Vee-type packing to wedge against the wash pipe causing it to groove. If new packing is put in on the old wash pipe (where the wedge has occurred) the mud is not sealed off. This can be a cause of down time.

Engines. The drilling engine, being one of the most important units of a drilling rig, should be under constant supervision. At the slightest indication of trouble the driller should check and try to locate the difficulty. Frequently the trouble may be traced to minor items such as dirty spark plugs, bad points or poor magneto.

Probably the most important thing to remember about an engine is that it should, at all times, have a sufficient amount of good clean oil. Oil filters should be replaced regularly and the oil level maintained at all times. Due to the strenuous conditions under which oil field drilling engines operate, lack of constant attention to such details can result in scored cylinder walls or even a burned out engine. Oil is cheap; engines are not!

The temperature gauge should be watched at all times and if the engines show signs of running hot, the hose and connections should be checked for leaks. The radiator should also be checked to make sure that it is filled with clean water. Some waters require chemical treatment to prevent scaling and the careful driller or toolpusher should make certain that the radiator water is free from contaminating and corrosive chemicals. Radiator scale will sometimes cause an engine to overheat. If this occurs run some good radiator cleaner through it and then flush with clear water.

Air cleaners may not seem important, but they are. They should be washed out constantly so the engine can "breathe" good, clean air.

Drawworks. Drawworks should be lubricated at least three times a day and the operator should make sure there is plenty of good clean oil for all of the oil system. Sprockets should be replaced when worn, since badly worn sprockets will wear out the drive chains very fast. When a chain is worn it is best to replace it with a new chain instead of patching it, otherwise it will continue to give trouble and result in costly down time.

Replace brake linings when needed, for when they get thin the bolts in the lining will groove the brake drum, resulting in short life from new linings. Brakes are very important and also very dangerous when worn, so be sure to check regularly.

Drill Pipe and Tool Joints. Since drill pipe and tool joints are among the most expensive items of a drilling rig (and sometimes hard to get), constant care and attention to their performance means profitable operations for the drilling contractor. Careless handling often results in discarding and junking thousands of dollars worth of good steel. This can be avoided if the careful driller checks carefully on every joint that goes in or comes out of the hole. If drill pipe is used, instead of drill collars, to provide weight on the bit, the operator runs the risk of the tool joints rubbing the walls of the hole, reducing the O.D. and causing tool joint failure.

Pipe should always be kept as straight as possible since a crooked joint will experience surface wear of pipe and tool joints.

Drillers should particularly check for cracks or leaks in drill pipe and tool joints. Unless these areas of possible failure are detected, a costly fishing job can result.

Another important point is to always use a reliable tool joint compound, and always apply tongs to tool joints and not the drill pipe since this can cause crushed pipe or scarred pipe which can deteriorate into serious cracks or breaks which can result in costly fishing jobs.

Sand has a very abrasive effect on tool joints and the careful operator should always use a shale shaker and jet pits regularly to keep drilling mud free from sand.

Wire Line. Maintaining the wire drilling line is also very important.

To assure long life and a long run on wire rope it is necessary to keep the line well greased with a good wire rope lubricant. In this regard manufacturers' lubricating specifications should be followed as they are based on extensive field experience.

When cutting wire line it is important to slip line and cut it off on the drum end since that is the part that experiences the greatest wear and abuse. Another recommended practice is to keep the sides of the drum built up so that the line will spool smoothly at all times and will not be cut or damaged by the drum. The amount of line to be cut off varies with size of rig mast and sheaves. Whenever wire lines show signs of wear they should be replaced. Frayed and worn wire lines are a real safety hazard.

Rotary Hose. All rotary hose is tough and made to withstand high pressures, but not abuse. A rotary hose should never be stretched around and against any part of the drilling rig. It should not be permitted to rub or bump against the derrick or rig floor while drilling.

Avoid back twisting of the hose when making up to swivel and stand pipe. If whipping or jumping of the hose is experienced a suitable surge chamber should be installed to relieve this condition.

Down time may not result from hose failure since many rigs are equipped with spares. But rotary hose is expensive and in the interest of economy should be properly cared for and maintained. —**The End**

About the Author

RALPH F. BLAIR has been with National Supply Company for eight years and is field sales representative at Cushing, Okla. He spent five years in the company's Oklahoma City store and two years at the store in Ringwood, Okla. As a field sales representative it is his duty to call on all drilling rigs in his territory and not only to sell equipment, but to advise how to keep equipment in good condition and running.

AUTOMATIC ROTARY TABLE with built-in power slips for handling either drill pipe or casing.

Rig Modernization Will Improve . . .

- Safety
- Efficiency
- Performance
- Economy

By LAURENCE E. FERGUSON,
Industrial Supply Company of Texas, Tulsa

MODERNIZATION OF equipment can mean real dividends. Modernization does not mean just bigger, it is not just novel. Nor is it just "streamlining"—another overworked misnomer.

Conceivably the basic idea of modernization in the mechanistic sense, machine specification and use, must be directly related to the efficiency ratio in performance, time, power or energy consumption and loss, reduction of lost motion, and safety. In investment and performance the dollar-horsepower-pound ratio holds as a prime factor, as well.

Other elements involved in modernization may be classified as psychological in character—such elements of influence as prejudice, inertia and habit. Nor are these possible deterrents all on the side of the user or buyer. Most of these elements are evident from time to time in some degree, in the thinking, design, and ultimate product of the engineer, artificer or manufacturer.

Consideration is also due the proper search for the means and methods of more exact mensuration or determination, of obtaining better control, as well as the goals sought in improved characteristic of machine, or equipment in power, speed, durability. In well drilling, what goes on thousands of feet in the ground is still much of a mystery, but a better idea of what is actually there is always needed. The instruments, tools, methods, test analyses and ultimate deductions and "answers" come high on the list of desirables in truly modernizing a rig.

In this over-all view we concern ourselves with these phases of quality, characteristic and performance within these areas of reference:

- Efficiency
- Safety
- Portability
- Economy

Although these factors are interrelated in regard to rigs, rig components, the work done, and the character or quality of performance, we shall consider them singly.

Efficiency. Operational, mechanical and functional efficiency concerns the following elements: Improved power-ratio, distribution, versatility of flexibility, in view of specific requirements of specific functions—a design factor. Sample: operation of a 750-horsepower power plant for a 175-HP operation, as rotary table drive; for a 15-HP job as in catheading.

Has the design of drawworks unit (and basic power plant) gone too far toward a do-all, all purpose machine? There was a day when integration and combining of facility for manifold function was more desirable than was afforded by the simple hoist then extant. It may well be indicated now that some separation makes for economy and efficiency. This has given rise to more favorable attention to independently-powered tables. A number are time-tested and proven, available on the market today. Almost

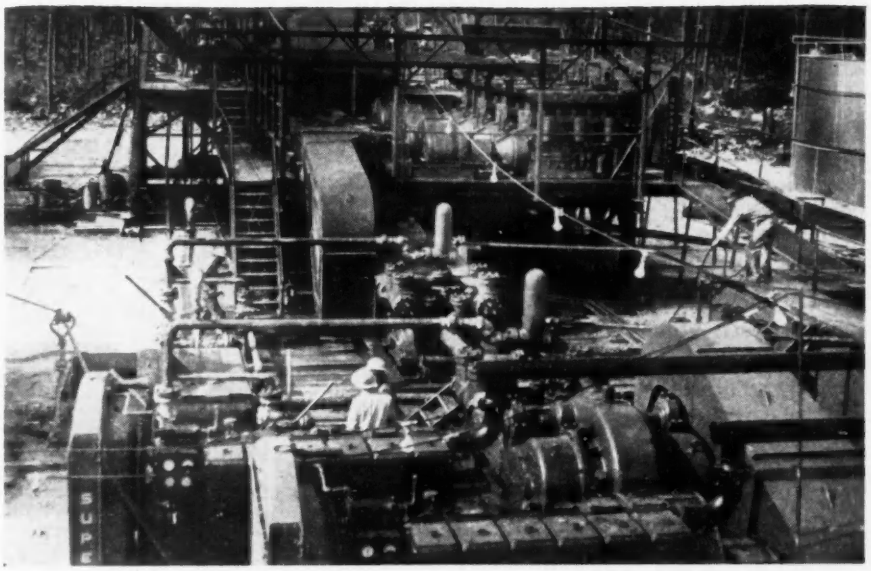
infinite flexibility of speed and control, greater facility for accurate gauging or measurement of torque (on drill string) and its control, and savings in power generation, are effective claims to such an adjunct. This type major component is adoptable to presently operating conventional equipment without too much conversion expense.

Pump operation accounts for a major portion of power needed for total rig commitment. Independently powered slush pumps, in split-type rigs increase in favor in shallower drilling but this idea may well extend to heavier equipment as well where provision is made for both standby and auxiliary pump unit drive from basic or prime plant, companion to the independently powered unit, when needed.

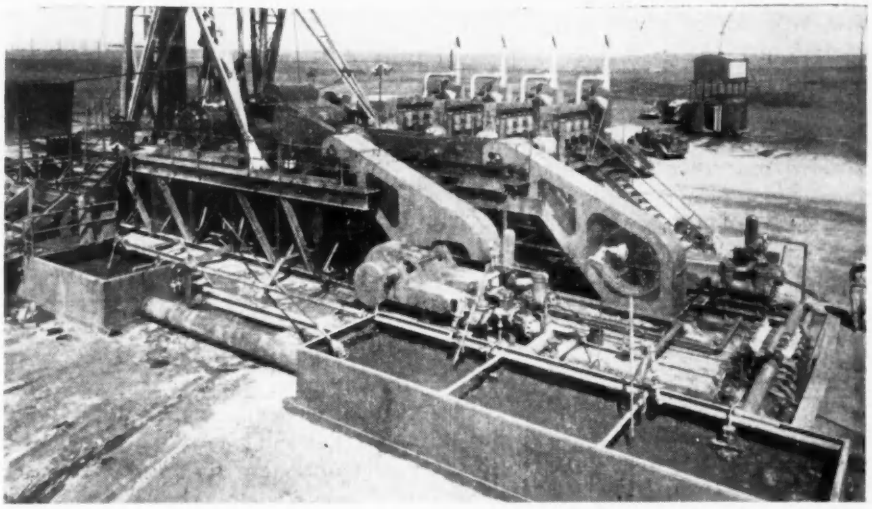
This same matter rouses further study of the fundamental question of pump size and power requirement. Aside from standby requirement of contract or special conditions of hazard, the question of multiple smaller units vs. single larger units is posed. Increased pressure and velocity, and reduced volume may indicate that a battery of combined, smaller displacement units, to be operated in series will effect greater savings (1) in power required, (2) in original investment, and (3) an increase in flexibility or versatility and range of use, particularly in newer jet-drilling practices. In the deeper drilling, for which some makes or types of pumps of extreme displacement capacity, input, horsepower, and cost first seemed required, closer study, tests, and more clearly definitive data now appear to warrant recasting and further resolving the problem. Here too, multiple units, in series may provide a more feasible, more practical and economical system.

As the result of study, experiment and development of engines, certain trends are to be noted. In general there is further tendency to employ units of larger bore and stroke instead of multiple compounded smaller units of the so-called automotive or industrial types.

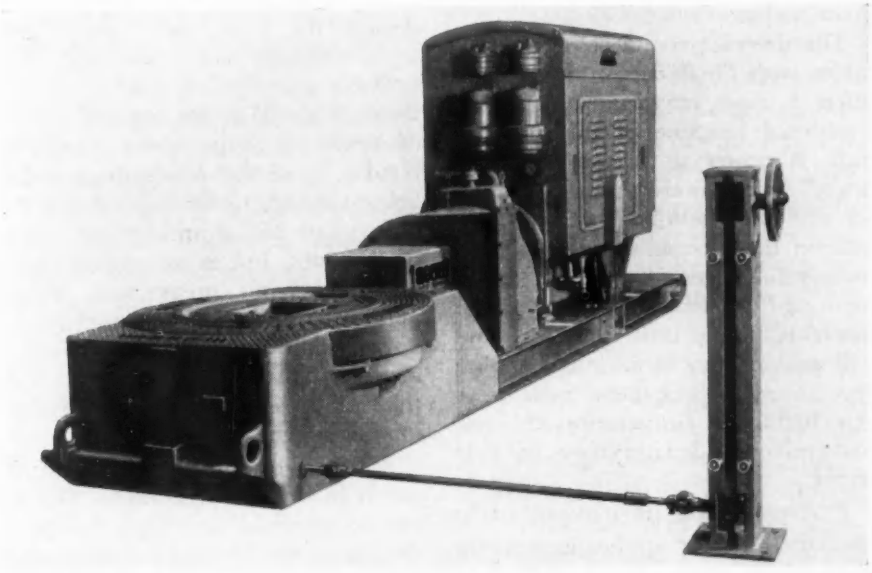
"Twinning" of units has increased in those available today. Larger displacement combustion engines in some makes now tend to follow the plan of affording various combinations or



TWO 18-INCH POWER MUD PUMPS are independently driven. The auxiliary mud pump is powered from drawworks compound.



PORTABLE MUD PITS, double-deck tool house and dog house, portable mud mixing pit and pump unit make for speed and convenience in moving and operation.



ROTARY TABLE independently powered by gas engine through torque converter—with torque gauge and controls.

multiples of cylinders, "sectionalized" in type, of basic pattern, bore stroke and section-unit dimension. Thus plants of 3, 4, 5, 6, or 7 cylinders, with companionate increase in power, are available for varying power needs, yet still retaining the most desirable element of standard parts, interchangeable cylinder package-unit. Further experiment continues as to fuels, but apparently the diesel trend has slackened these later years because of the loss in cost advantage formerly held for diesel fuel partly because of later revision of tax imposition. Wildcatters in a good number of areas still favor diesel.

Development of gas turbine power units continues experimentally, but none are yet available to power rigs. Because of universality of usable fuels, or combustibles, this type power may engender a new trend, or at least a new type to be given serious consideration.

At present the search for and the choice of type power, fuel, favored or required, cylinders and displacement pattern, may rove in an open field. Even though final answers are not clearly established, consideration should be given by the drilling contractor, rig operator and equipment makers.

Efficiency in the further mechanization of many rig or crew functions results in savings, in man-hours labor, reducing fatigue and augmenting safety practices and features. Power-slips, power-tongs, automatic or power-assist servo-devices in physical operations in particular in areas of control equipment gain greatly in favor and employment.

The development of new rotary tables with "built-in" power slips, offers a more completely integrated functional machine of this essential unit. A power actuated "racking-mule," with powered arms or fingers for drill pipe handling both on floor and on derrick-man's racking platform results from continued experiment and development. These will be available to the trade currently and will provide mechanical and service type accessory equipment. Such progress highlights furtherance of comprehensive modernization in this sector.

Progress in the improvement in bearings, in their applications to rig components is notable though little publicized. Even more gain is noted in improved types of clutches, drive elements, drive engagement, controls, friction elements, materials and devices. Particularly significant in effective operation are improved power-assist or actuated controls, pneumatic, hydraulic, electric or various combinations thereof.

Improved lubrication systems and devices for "one shot" centralized units, pressure, measurable and controllable type "grease guns" and systems are aimed at this important area of need, to assure more complete, regular, consistent and systematic lubricant service to bearings, shafts, rotating and piston and cylinder type mechanisms. Just as essential are new sealing elements, grease seals, o-ring applications, with built-in relief mechanism, improved durability to friction, abrasion, physico-chemic reaction, that afford real progress in operation, maintenance and utility life.

Fluid-drives are gaining significantly in use and acceptance. Torque converters, fluid couplings, and such devices of the hydraulic-turbine class have proved their merit in flexibility of power application, and control, reduction or elimination of shock load and impact upon prime mover, and the train of power transmission. Several types on the market augur well for further advancement in this phase but present types offer to the operator desirous of modernizing, ready application to and benefit from his present equipment. Other types than truly hydraulic are available also in both pneumatic and electro-magnetic, and certain types using combinations of these. The same may be said for braking devices and service and notably a better product or design and lesser unit cost for hoist-brake, as well as for other braking needs, has resulted from progressive development the last five years.

In the area of drive elements, for both drawworks and pumps, gain is noted in employment of "silent" types of chain of smaller pitch, higher flexibility, better lubrication characteristic —reducing both noise and wear, for longer life and capacities to function at much higher speeds of travel deemed permissible and practical.

Conversion or application of new equipment to presently operating equipment is sometimes difficult and expensive but new equipment can be specified. Further application and some use for slush pump drives of this type are to be noted, to gain the advantage of less overhang, equal or greater power transmission yet requiring less space.

One most important area of consideration for both user and manufacturer is that of more ready accessibility to "wear-out" replacement elements in rig equipment, bearings, seals, clutches and friction elements. Long a headache for the crew-man or mechanic, this matter has not had close enough consideration by the design-engineer and manufacturer. Money, as well as irritation, frustration and unnecessary difficulty for the mechanic and his employer, is involved.

Safety. Safety in machine and in operation is tied in with efficiency, and efficiency with safety. The attitude of manufacturers and sales and service personnel is crudely but emphatically stated in the remark, "We can make it almost foolproof, but not idiot-proof!" The reflection simply recognizes that the human error of judg-

About the Author

LAURENCE E. FERGUSON, district sales manager at Tulsa for Industrial Supply Company of Texas, Wichita Falls, has been in oilfield operations, equipment and supply business since early days of the Seminole boom. He has served as sales manager for several leading equipment manufacturers in his broad experience in machinery, and oil well drilling equipment.

He is a native of Oklahoma and was graduated from the University of Oklahoma in 1925. He is a member of Nomads, Engineers' Club, IPAA, Petroleum Club of Tulsa, Tulsa Club, and active as an officer and trustee of All Souls' Unitarian Church in Tulsa.

ment or negligence can defeat any safety device on occasion.

Every rig component, large or small, as a machine, can be lethal, in the moment of careless scorn, or lack of studied respect.

Safety studies, planning and design aim at (1) protection of function, (2) protection of personnel, (3) economy and efficiency. Automatic and semi-automatic devices, cut-offs, throw-out clutches, arresting brakes, bypass valves and switches are offered currently by both basic manufacturers and the "specialty men" who follow closely.

Modernization in the sense of using the latest, most practical and effective means and devices designed toward reasonable safety and prudent operation calls upon a rich field of constant change, improvement and sometimes extravagant claims. Practical safety is practical efficiency but much of the responsibility is still upon the operator. If he elects to use or permits the use of a piece of welding rod in a shear-relief type pump line valve instead of the soft iron nail specified, he has deposed the governor. Gadgets won't do it—but there are many sound, practical and effective safety devices on the market today—the good operator uses them, and insists that his crewmen respect and utilize them as such.

Portability. Portability is patently directly related to basic design in the full view of two factors, (1) highway regulations, and their expected more stringent enforcement, (2) tear-down, move, and rig-up time representing money of consequence.

Certainly this element has a strong bearing on such as selection of pump size for it is imposed upon the basic problem without any easy alternative. Likewise it throws its weight around in the problem of selection and use of power plant, and derrick or mast, and substructures, although in the latter instances an easier compromise is at hand.

The answer is not altogether within the range of considering only the weight of basic materials, even though the first approach is from this angle. Lighter than steel alloys, aluminum, magnesium, offer no cure-all even at great disparity in section weight. Cost of materials and sometimes excessive costs of fabrication can be self defeating. Moreover there are plainly a number of functions and requirements in rig components and their operation in which weight and mass may be inherently of direct essentiality.

Lighter, and stronger, derrick masts and structurals are available today—improvement in utility, function and capacity goes on apace, with "roadability" of maximum package, and minimum dis-assembly as secondary ends, of necessity. In general, continued design and material changes will be essential, for the course of "the law" is currently in the other direction, perhaps also of necessity.

Economy. As is most obvious the net gains in efficiency, safety and portability spell out the sum of whatever real economy is achieved. Trite it may be but efficiency with safety, adequacy with legal and practical portability are fundamentally requisite to economy for rig investment, operation, and function. Here too it is apropos that to get the right answer, the right question must be asked—and part of the problem is to reasonably, cogently formulate the question. No discussion of prime essentials in rig equipment, operation and method should be concluded without mentioning at least the study advisably to be accorded such matters as:

- Selection of type 'drilling-fluid' media, mud, oil, air, gas, and the proper equipment required.
- Types and ranges of drilling bits and methods taking advantage of conclusive field tests and experiment by specialists, and including such possible means as reverse circulation for some media in especial conditions.
- Further investigation of drill pipe and drill hole diameters in relation to velocities and return of cuttings, and the involved factors of fluid pressure and volume required.
- The importance of complemental field service, availability of parts, standardization of major components affording economy in interchangeability.

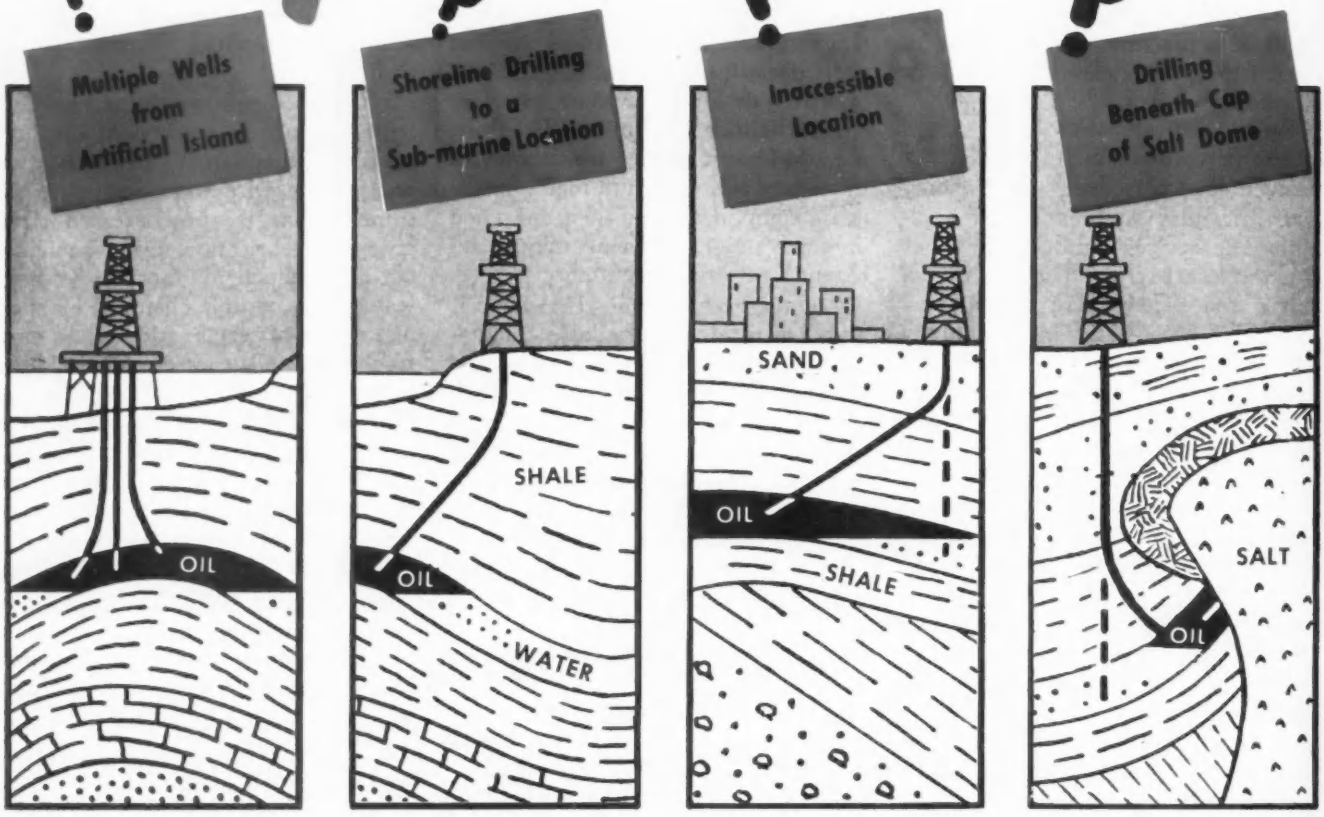
Other elements worthy of close attention relate to equipment life and utility, as ton-mile records and analyses on wire rope, including assurance that proper sheave sizes, grooving, lubrication, drum spooling, cut-off practice are not to be neglected: the possible chemical reaction and effects of certain additives in mud treatment and control on packings, seals, valves and operation, protective methods or means for equipment, in cleaning, painting, rust-proofing, inhibiting solution to be used. Each area of operation merits deliberate consideration and may well effect benefits.

The block-hook combination has caught on remarkably in some areas of use—yet there result the real and valid objections from some quarters, the derrick-man in many cases—it's hard to handle. Perhaps a power-assist "tool" for him would help. The torque tube drive for rotary tables replacing the noisy, obstructive side-drive chain, has not yet gained universal favor but is gaining in conventional equipment use. It may be fully accepted by the time it is perhaps outmoded by independently powered rotary tables with torque gauge and control, with built-in power slips, or powered make-and-break features. Catheading for make-up, break-out, making a connection, may well become the function, separately powered by hydraulic motor from remotely set hydraulic generator of either a separate "machine," or an adjunct of the table instead of the drawworks proper.

Slush pumps of the smaller bore, multiple cylinder, 2 or 3 stage, of the plunger type, incorporating ceramic-surfaced plungers operating through simple, long-wearing, easily replaced seal elements, may well supplant the behemoth duplex that comprises a big carload and costs a ton of money. Progress, it's wonderful!

—The End.

you Name the Problem —



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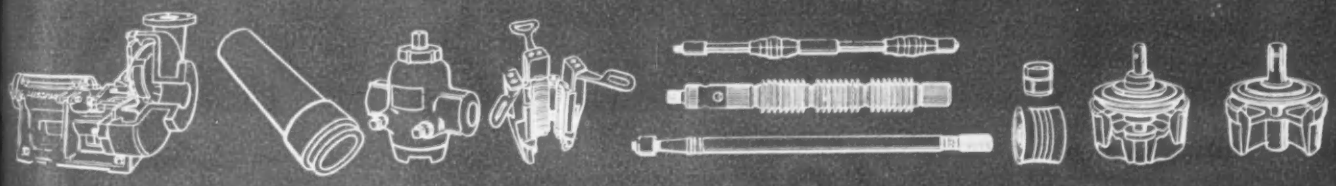

Editor's Note: *Accidents seldom happen on unusually hazardous jobs. It is the easy, routine task that invites carelessness and causes injuries. This is one of a series of pictorial safety messages taken directly from the files of companies in the drilling industry. Clip them. Put them on your bulletin board. Drive home the warning that IT'S EASY TO GET HURT!*

The Accident: After coming out of the hole with a core, the derrickman decided to take the well-known short cut to the rig floor and "expressed" down the drill pipe. At the same time, a floorman decided to walk across the floor to the pipe rack to get a wrench. The two met at the drill collars, causing injuries to both.

Safety Director's Report: Derrickmen should use the ladder. Floormen must be alert.

Selling Safety . . . The Goal of the AAODC

By H. W. DAVIDSON, President, Davidson Drilling Company, Midland, Texas, Chairman AAODC Safety Committee

THE AMERICAN Association of Oilwell Drilling Contractors is expending time, effort and funds to improve the safety record of its membership and the drilling industry as a whole.

The ultimate goal that the AAODC hopes to achieve with program is, obviously, the prevention of accidents to operating personnel.

Each year since its formation the AAODC has used every feasible means at its command to make available to membership a safety program based on simplicity, adaptability and economy. The AAODC fully realizes that its safety program must contain the aforementioned qualities, if it is to be accepted and vigorously applied.

When the AAODC safety program has been prepared and is ready for presentation to the membership, there are two prime objectives that must be reached if the program is to be successful. First, and of unquestionable importance, is that of convincing the contractors and/or top management that a safety program can be and should be included as an essential part of operating procedure. This particular objective has been a challenge to the AAODC. Far too many contractors and/or top management take refuge in the time-worn attitude that a workable safety program cannot be designed to fit the drilling industry. No prudent contractor can long assume this attitude. One glance at the present compensation rates, particularly in the state of Texas, is proof enough that the drilling industry is in dire need of an effective safety program.

The second prime objective to be attained is that of getting the program to the field and presenting it in the proper place and at the proper time. The Area Safety Clinic has afforded the best means of getting the AAODC safety program to the men in the field. These clinics are conducted periodically in all the active drilling areas of the U. S. They are sponsored by the various AAODC chapters and they are open to all personnel from rig owner to roughneck. Programs are scheduled for evening meetings and in some areas all-day sessions are held. Program matter consists of motion pictures, papers on safe operating procedure, demonstrations, and open discussion of the hazards encountered by rig personnel in their respective locale. In the past two years 17 of these area safety clinics throughout the country have been attended by approximately 1000 men from the drilling, producing and related segments of the petroleum industry.

The area clinics, particularly, afford the small drilling contractor an opportunity to see how easily and economically a safety program can be placed into operation in his own organization, because the majority of one to four rig contractors feel that they cannot bear the expense of a full-time safety director to prepare safety programs and see that they are carried out.

One of the highlights and accomplishments of the AAODC safety program has been the ever-growing acceptance by the drilling industry of the Annual Drilling Industry Safety Clinic. This two-day safety session, sponsored by the association, attracts industry personnel from home and abroad. A great deal of time and effort is devoted to the programming of these annual clinics. Oil company executives, safety experts, insurance underwriters, moderators, contractors, drilling superintendents, toolpushers, drillers and roughnecks meet together for the primary purpose of disseminating information regarding the various aspects of accident prevention work.

The accomplishments, to date, of the AAODC safety program certainly cannot be classed as spectacular. In a small measure the AAODC may rightfully acclaim that it is gradually achieving some of its objectives. When contractor and management come to the full realization that economic and humanitarian factors are involved, then it can be rightfully assumed that a safety program will be inaugurated and carried forward on a sound and businesslike basis. The AAODC safety program can be successful only if it has the whole-hearted support of the membership.—**THE END.**

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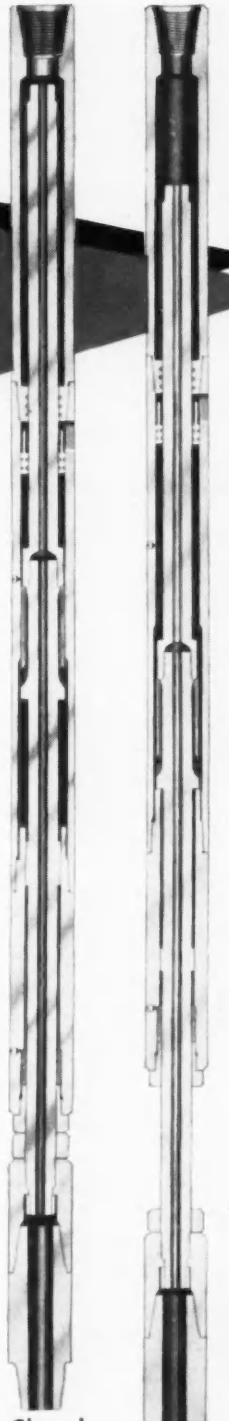

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Try Barbecues and Bonuses

By AL REESE, WORLD OIL Staff

BARBECUES AND BONUSES will make your company a safer place to work.

That is the experience of Southeastern Drilling Company of Dallas, the company that didn't want a cut-and-dried safety program.

Southeastern's safety record was so poor that the company was dropped by its insurance carrier. The firm managed to obtain a policy elsewhere, but it was accompanied by the "rider" to "Improve your safety record." Top management must take an active interest and work at it.

And Southeastern did. Without installing a safety program as such, the company in less than a year:

- Reduced gross accidents by 44 percent.
- Reduced lost-time accidents 59 percent.
- Reduced no lost-time accidents 33 percent.
- Reduced losses by $29,000.

The answer, according to W. P. Clements, Jr., general manager and partner in the firm, is a sound employe relations program. "Get that and safety comes naturally."

In probing its accident record for an avenue out of the dilemma, Southeastern found, as has many another company, that the turnover crewmen, the newcomers, were getting hurt far more frequently than the seasoned workers. The obvious solution was to reduce the turnover.

Southeastern drew up an 11-point employe relations program with the goal of obtaining a 65 percent basic work force with six months experience at Southeastern. This goal has not yet been attained, but a comparison for the first and second six-month periods after the program was installed revealed that personnel turnover had been reduced 40 percent.

The program:

1. Bonuses were put on an assured yearly basis and fully explained to every employe.

2. Paid vacations are granted those who work a year without a lost-time accident. This benefit carries the stipulation that the vacationing employe must leave behind him a subordinate capable of stepping up to his job. The effect is a keener interest among veterans in the proper instruction of newcomers.

3. Crews which work 60 days without a lost-time accident are given a barbecue. The safety records are now such that these functions are virtually company-wide celebrations. Company home office officials attend.

4. Association safety certificates are awarded, and the men are proud to have them.

5. Each employe with service of one year is given a paid-up, double indemnity life insurance policy. This is not as expensive as it sounds. Southeastern found that many of its employes were without such insurance, and the company would have felt an obligation and probably extended help anyway. The firm's records show that 96 percent of rig labor with service of one year or longer have not had a lost-time accident.

6. A company bulletin is distributed regularly. It contains safety records; accounts of accidents, setting forth who was hurt and how; a few jokes; stories on social activities; news of company sports.

7. Ten-minute rig safety meetings are held weekly under the direction of the driller. The toolpusher is conspicuously absent, which encourages outspoken criticism. New ideas for job improvement are credited to the men, and circulated in the company bulletin where the employe is given recognition for the idea.

8. Management meetings are held for toolpushers only, for toolpushers and drillers, and for drillers and crewmen. Of three hours duration, followed by a dinner at company expense, these meetings are said by Clements to be one of the most vital phases of the program. Films on equipment are shown and talks given by experts on drilling procedures and materials. The result is a safer, more efficient personnel and a stronger bond between employe and company.

9. The company uses its purchasing power to help employes buy home appliances at reduced rates.

10. Southeastern works closely with its insurance company by conforming to its practices, heeding its suggestions. "The insurance company can't do it all for you," Clements says. "You have got to go half-way." When an employe is seriously injured, a company official helps the insurance company work out the settlement. This simple act of humanity expedites the claim for the employe and minimizes the chance that the injured will call in a lawyer—a practice which accounts for higher insurance rates and a lowering of morale with almost complete degeneration of employe-employer relationship.

11. The company helps employes in need.

Southeastern claims no perfect solution to the accident problem. Every drilling concern will have a different set of problems and basic facts to work from. But until the perfect solution comes along, it'll stick by barbecues and bonuses.—**The End.**

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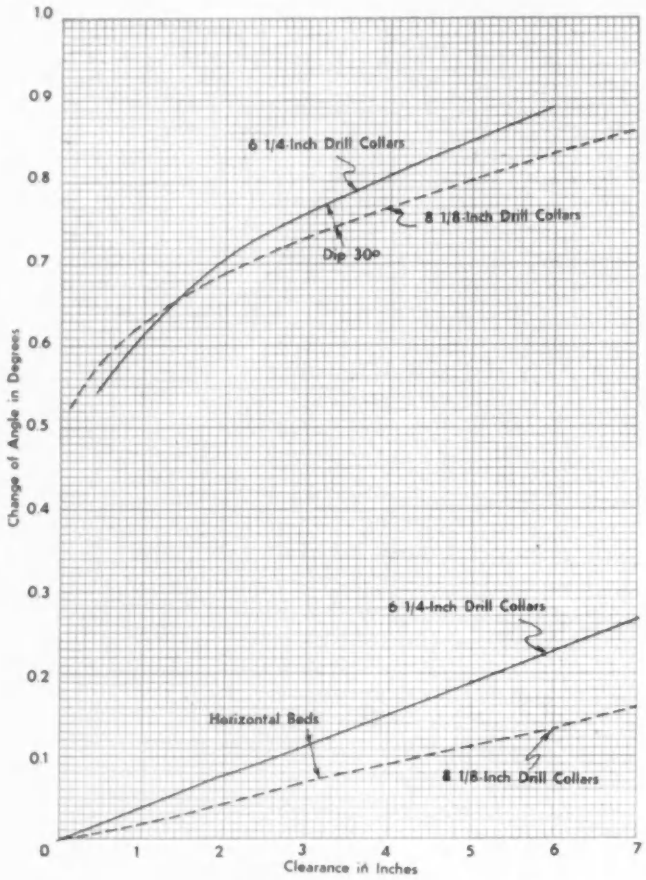


Fig. 14—Instantaneous change of angle due to drop of weight from 36,000 to 18,000 pounds. Anisotropy index h = 0.025.

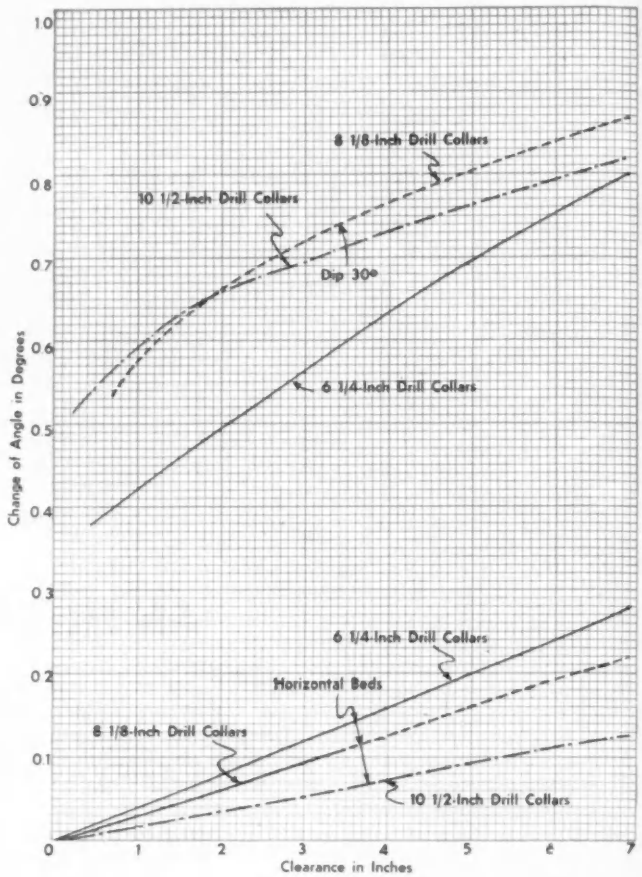


Fig. 15—Instantaneous change of angle due to drop of weight from 18,000 to 9000 pounds. Anisotropy index h = 0.025.

How to Cut Costs in Crooked Hole Areas

What causes and what can be done about . . .

- Doglegs
- Helical buckling

By ARTHUR LUBINSKI, Stanolind Oil and Gas Company, Tulsa, and **H. B. WOODS,** Hughes Tool Company, Houston

Doglegs. Up to this point, we have been studying the angle toward which the hole tends, or equilibrium angle, with little or no consideration for the changes in hole angle which are taking place while this equilibrium is being reached. Actually, no troubles may be expected from the hole inclination itself. Directional holes are sometimes drilled with inclinations as high as 70 or 80 degrees with a minimum of drilling or production troubles even if beam pumped. On the other hand, troubles may be expected from doglegs.

Doglegs normally result from a change of conditions such as a change of weight or a change of formation property. Such changes cause an instantaneous change of hole direction, but the continuation of the hole along its new direction may soon be prevented by the drill collar contacting the wall of the hole close to the bit.

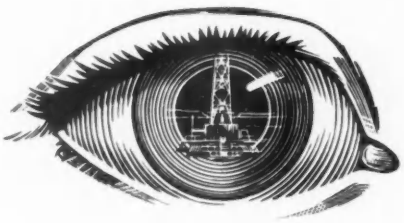
Part 3

First study the instantaneous change of angle affected by:

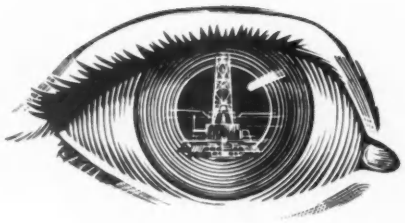
1. A sudden change of weight;
2. A sudden change of formation dip, i.e., crossing an unconformity.

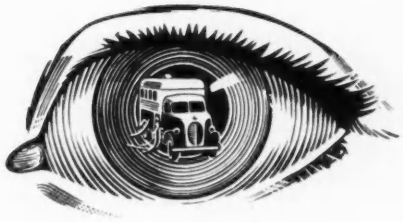
Next study the continuation of a dogleg after the instantaneous change of angle occurs.

Start of a Dogleg by a Sudden Change of Weight. Sudden changes of angle caused by changes



drill...





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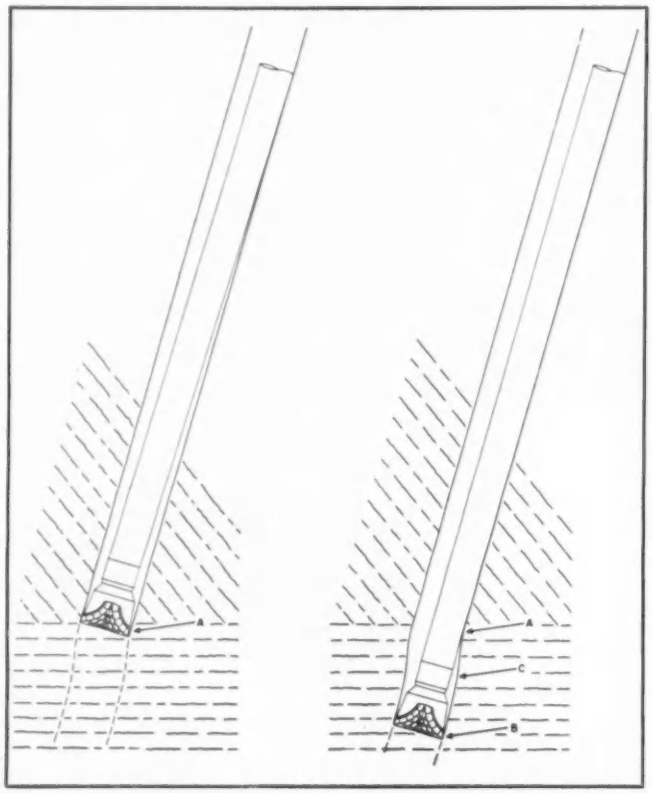

Figure 16A **Figure 16B**

Dogleg due to going from inclined to horizontal beds.

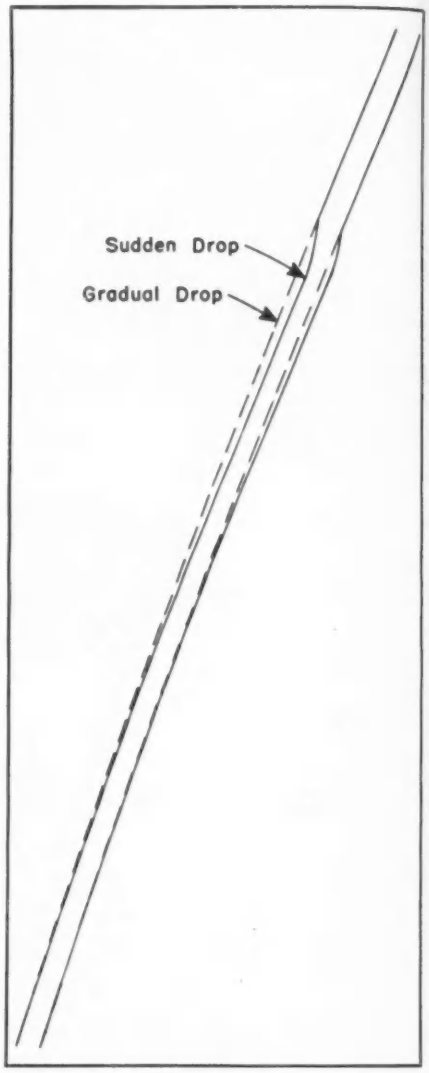

Fig. 17—Effect of drop of weight.

of weight were computed for a formation of anisotropy index h = 0.025 and plotted in Figures 14 and 15 which are for a drop of weight from 36,000 to 18,000 pounds and from 18,000 to 9000 pounds, respectively. In these drawings, the change of angle is plotted vs. the clearance between the drill collars and the hole. Curves are drawn for horizontal beds and for 30-degree dips, and for various sizes of drill collars.

It is immediately obvious from the inspection of these drawings that much higher instantaneous changes in angle result from a drop of weight in inclined beds than from the same drop of weight in horizontal beds; and that the effect of beds is much stronger than the size of drill collars.

A comparison of Figures 14 and 15 shows that the order of magnitude of instantaneous change of angle is the same for a drop of weight from 36,000 to 18,000 pounds as for a drop of weight from 18,000 to 9000 pounds, this change of angle being primarily influenced by the formation dip.

Thus, a conclusion may be reached that a recommendation previously made in this paper to drill cheaper holes by carrying more weight and accepting more deviation should not result in sharper doglegs.

Both Figures 14 and 15 show that for a 30-degree dip, the order of magnitude of the instantaneous change of angle is less than 1 degree. Although calculations have not been made for greater dips and greater anisotropy indices, it is apparent to the authors that for such conditions the change of angle would be more than proportionally greater. This indicates that in highly inclined beds, sudden changes of weight should be avoided.

Figure 14 shows that 6¼-inch collars give lower angle changes than larger collars for 30-degree dips when the weight is dropped from 36,000 to 18,000 pounds. For other dips opposite results might be obtained and actually no conclusions can be reached about the influence of collar size on the instantaneous change of hole angle in dipping formations.

Consider the effect of hole clearance on the instantaneous change of angle caused by a sudden drop of weight. Both Figures 14 and 15 show that in all cases reducing the clearance reduces the change of angle. Percentagewise, this effect is much smaller in inclined beds than in horizontal beds. Consequently, it seems that reducing the clearance itself, or using many stabilizers in the lower portion of the string, would be of doubtful benefit in reducing the instantaneous change of angle in steeply dipping formations but may be of great benefit in slightly dipping formations.

In the above study, effects of a sudden drop in weight were consid-

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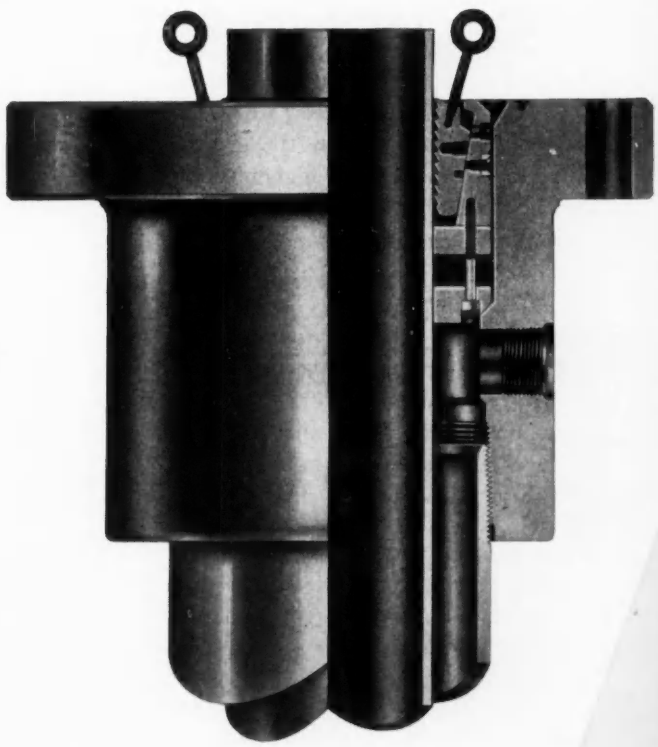

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ered. A sudden increase in weight gives similar results.

Start of a Dogleg by Crossing Unconformity. Suppose that, while drilling, an unconformity is encountered and that the beds are horizontal on one side and inclined on the other. Then the instantaneous change of angle $\psi - \alpha$ (see Figure 8 Part I) is equal to:

$$\psi - \alpha = h\gamma$$

in which h is the anisotropy index and γ the formation dip on one side of the unconformity. This formula means that the instantaneous change of angle does not depend on weight, collar size, clearance, or hole inclination, but depends only on formation. Thus, once more, we conclude that the previous recommendation of drilling with more weight on the bit and letting the inclination build up does not result in sharper doglegs.

Take, for instance, $h = 0.025$ and $\gamma = 30$ degree. Then, the instantaneous change of angle is 0.75 degrees. The change in angle will be greater for steeper dips and for higher values of anisotropy index.

Actually, the above formula holds true only for small dips. For large dips, the instantaneous change of angle depends not only upon the formation, but also upon the other previously mentioned factors. The authors believe, however, that for dips such as 30 degrees, the formula gives a satisfactory approximation.

Continuation of Dogleg. Investigated so far has been the instantaneous change of angle which is the start of a dogleg. Follow the continuation of a dogleg, Figure 16a shows a straight, but inclined, hole drilled through steeply inclined formations to an unconformity on the other side of which the bedding planes are horizontal. As the horizontal formations are penetrated, there is an instantaneous change of angle. Drilling progresses as indicated by the dashed lines in Figure 16a until the condition represented in Figure 16b is reached. At this stage, the drill collar contacts the wall of the hole at the unconformity (point A). When drilling below point B, as indicated by dashed lines in Figure 16b, the bit will drill parallel to the original hole until it has advanced far enough for the overhanging portion of the drill collar below point A to impart to the bit an appreciable force toward vertical.

If the clearance between collar and hole were smaller, the instantaneous change of angle would be substantially the same, as previously explained. However, the drill collar would then contact the wall at point A when the bit had advanced to some point above B, such as C. The hole would then continue from point C in a direction parallel to the original hole. It is obvious that the reduction of clearance reduces the misalignment between the upper and lower parallel portions of the hole. This misalignment is equal to one-half the clearance between the collar and hole. Thus, the reduction of clearance reduces the severity of dogleg.

In Figure 16, the dogleg is directed toward vertical. The foregoing conclusion holds true, however, for any dogleg.

It is believed that, for steeply inclined formations, this reduction of severity of doglegs is the main advantage in the use of smaller hole to collar clearances or, what is more or less equivalent, in the use of several stabilizers in the lower portion of the string.

In Figure 16 the dogleg was produced by an unconformity. A similar dogleg would be produced if the weight were suddenly dropped, as is often done when it is desired to reduce deviation. The resulting hole is illustrated by the solid lines in Figure 17. If the weight were gradually reduced to its final value, a hole illustrated by the dashed lines would be drilled. The results would be:

- the same over-all hole straightening;
- no dogleg;
- faster drilling.

When it is desired to increase the weight on the bit, a gradual increase will also avoid a dogleg.

The conclusion is that in crooked-hole territory, large changes in weight should be graduated over a 15 to 30 foot interval.

Helical Buckling. This investigation was made with an assumption that the drill collars lie on the low side of the hole, as shown in Figure 1 (see Part I). Actually, even in the absence of any rotation, there are conditions for which the string does not lie on the low side of the hole, but buckles into a helix.

A theoretical study shows that for a given dimensionless weight on the bit, there is a value of α m/r below which helical buckling may occur and above which it cannot occur. Model experiments were made fixing

About the Authors

ARTHUR LUBINSKI is a graduate of the University of Brussels in Belgium where he studied electrical and electro-chemical engineering. Before World War II he was a research and development engineer in Belgium. Following service with the French Forces of the Interior during the war he served the French government in a department for emergency rebuilding of war-destroyed areas. He came to the U. S. early in 1947 and is now with Stanolind Oil and Gas Company in Tulsa, Okla.

Arthur Lubinski

HENRY B. WOODS joined Hughes Tool Company of Houston as a laboratory analyst in 1925. He was graduated by The Rice Institute, Houston, in 1928. He has served as chief chemist, testing engineer and laboratory director for Hughes. Since 1945 he has been assistant director of research engineering for Hughes. He is a member of API, AIMME and the Houston Engineers Club.

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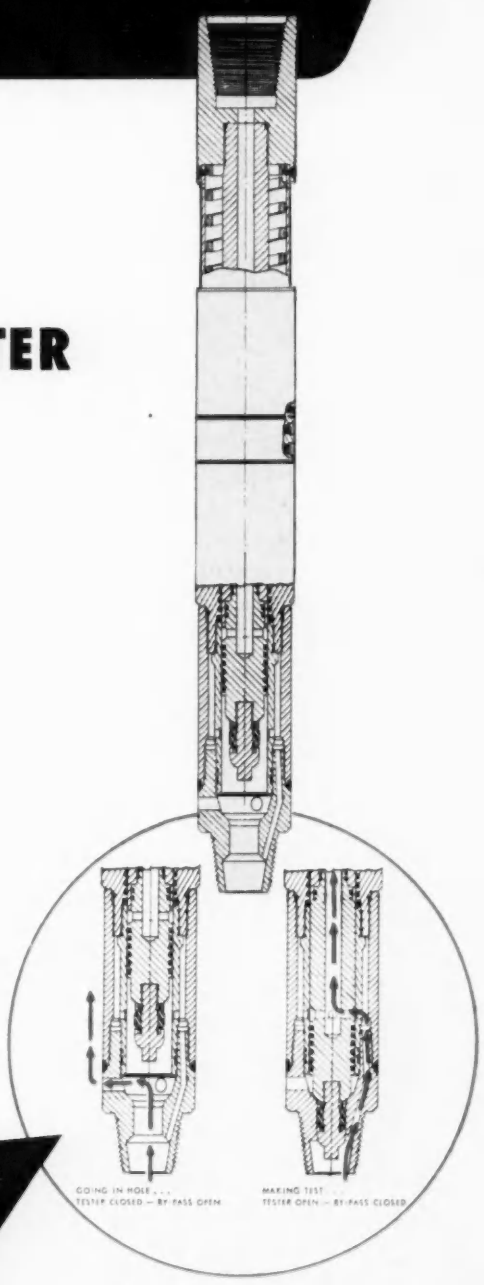

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the limiting value of α m/r for different dimensionless weights. The results are shown in Figures 2 and 5 (see Part I) in which the portions of the curves drawn with dashed lines indicate helical buckling conditions.

The use of the curves of Figure 2 (see Part I) has shown that helical buckling occurs only when the weight is suddenly increased in a nearly vertical hole drilled in horizontal or nearly horizontal formations. In inclined beds the collars always lie on the low side of the hole. In horizontal beds the collars lie on the low side of the hole for equilibrium conditions and when the weight is being decreased. In fact, in almost any actual situation encountered in drilling, the possibility of helical buckling of drill collars may be ignored.

Suggestions for Future Research. It was assumed in this paper that, in isotropic formations, drilling is performed in the direction of the force imparted to the bit. In other words, it was implicitly assumed that bit ability to drill is the same in the axial and lateral directions. Actually, these two abilities are not necessarily equal and their ratio certainly depends upon the type of bit. An extensive experimental program is being conducted now by one of the authors in order to determine the relative abilities of bits to drill laterally and axially. After completion of this program, the mathematical findings of this paper might require some modifications to make allowance for the type of bit.

The use of stabilizers investigated in this paper concerns the case of many stabilizers located in the lower portion of the string. The effect of the location of one stabilizer only could be studied by the means used in this investigation. A previous publication[6] concerns the location of one stabilizer in a vertical hole and not in an inclined hole.

The downdip drift of bore holes was not mentioned in this paper. It is well known that in very steep and soft beds the bit may drift downdip or along a contour line. The authors believe that these phenomena might be studied by making allowance for frictional rotational effects and for differences in the ability of the bit to drill laterally and axially.

• This is the third and concluding part of this article. A discussion of the article will appear in the October issue of WORLD OIL.

Conclusions

1. Drilling a perfectly vertical hole with an elastic drilling string is impossible, even in horizontal formations, unless very low and uneconomical weights are carried.
2. In crooked hole territories of hard-rock areas, such as West Texas, Mid-Continent and Rocky Mountains, cost of drilling may be lowered by:
   a. Carrying much more weight and deliberately accepting a larger deviation. (Large savings were made by carrying more than 30,000 pounds and letting holes go off as much as 17 degrees. In wildcats, the updip drift may increase the chances of a discovery.) This does not result in sharper doglegs. Such a method could not be used in steeply dipping formations because unreasonable deviation would result.
   b. Using larger drill collars with which more weight may be carried without increasing deviation. Examples: 8-inch collars in 9-inch hole, 11-inch collars in 12¼-inch hole.
   c. Using both foregoing methods in conjunction.
3. Extreme reduction in hole clearance, such as by the use of several stabilizers in the lower part of the collar string results in:
   a. A decrease in severity of doglegs.
   b. A decrease in hole inclination in slightly dipping formations for heavy weights only.
   c. No decrease in hole inclination in steeply dipping formations.
4. Sudden large changes of weight in crooked-hole territories cause doglegs and should be avoided. Any large change of weight should be graduated over a 15 to 30-foot interval.

EDITOR'S NOTE

Acknowledgment, bibliography and complete list of references were published in Part I of this article, Page 142, July WORLD OIL.

—The End.

ERRATA . . .

Several errors appeared in the article entitled *"Do You Have a Problem of Directional Drilling?"* by W. H. Cook which WORLD OIL published on page 129 of the July, 1953, issue.

Paragraph 7, Page 129 should have read:

"Whenever a tool is set at appreciable depths it is as a rule 18 to 24 hours later before the crew can again be back on bottom with a conventional drilling hook-up. The net result is that you have sacrificed one day of rig time for twenty feet of hole assuming that 20 feet of hole is made with the deflecting tool. Therein lies your increased cost. Now don't misconstrue me, I am not in any manner attempting to tell you that a 40 acre target should be the objective of all deviated holes. My true intent is to impart the information that wherever possible most companies are allowing all practical latitude in regards to directional objectives in order to increase the penetration rates and thereby decrease their drilling costs."

This appeared in WORLD OIL as—"A 40-acre target should be the objective of all deviated holes."

On page 131 the first paragraph under the subheading survey and drilling assembly where reference is made to Figure 2A, should have read *Figure 2.*

Transporting rigs from one location to another presents some serious problems for drilling contractors. WORLD OIL interviewed several. Here they set forth some gripes and some suggestions on how to solve . . .

Hauling Problems

By ANTHONY GIBBON, WORLD OIL Staff

TRANSPORTATION IS a major item in drilling costs. From the drilling contractor's standpoint it is one of the hardest items to estimate and in many instances represents a factor which prevents the contractor from making a bid that is fair to himself and to the operator. While such major items as number of days and bits and other related items associated with drilling in an established area are well known, the question of ultimate charges to be incurred in rig transportation and miscellaneous hauling is often left to the imagination and when the bills are in, the contractor not infrequently finds the charges incurred have cut sharply into an otherwise narrow margin of profit.

While certain intangibles such as weather conditions at the time of moving and the state of the roads to be traveled are accepted as inevitable risks, there are other factors that could improve the position and about which something can be done. They are:

- Closer cooperation between drilling contractor and operator.
- Greater uniformity between states as to laws governing loads and vehicles.
- More careful selection by the contractor of the trucking firm that he engages to do his hauling.

Operators can cooperate with contractors in helping to keep transportation costs to a minimum, a factor that may well be reflected in drilling costs to the operator's advantage, by constructing more adequate roads and drill sites. In mountainous areas, for example, drill sites may be too small to permit easy access by heavily loaded trucks, necessitating unloading and reloading in order to set up the rig.

One Mid-Continent contractor who took a contract in the Rocky Mountain region complained that the operator staked his location at the base of an escarpment but failed to allow sufficient clearance for rig foundations. When the trucks arrived at the drill site the crew had to spend the better part of a day enlarging the drill site, with consequent loss of time and at a cost of several hundred dollars. The same operator failed to maintain its road to location and this negligence caused frequent stalling of trucks carrying heavy equipment and drill pipe during actual drilling operations. When the well was completed the contractor had spent between $2000 and $3000 for work which normally should have been performed by the operator. Since the contractor hoped to obtain additional work from the operator he accepted his loss but, he added, he worked it into the next bid.

West Texas Problem. In West Texas transportation over sandy roads presents a problem which can be overcome by the operator if the proper amount of caliche is spread over the route to the location. This foresight on the operator's part not only results in less trouble to the trucker and drilling contractor, but assures a quicker job and friendly relations between contractor and operator.

When companies call for drilling

Cargo insurance and mileage should be checked by the contractor

bids, contractors assume that roads to location are at least passable and that drill sites are clear and ready for rigging up. This work is the function, as a rule, of an operator's production department, and contractors point out that before submitting a bid they should not be expected to inspect the roads leading to the location, especially if the well to be drilled is located at a distance from the contractor's headquarters.

Inadequate drill sites and badly prepared routes to location are constant gripes with contractors who feel that considerable time and money can be saved if operators will cooperate in remedying such conditions before the contractor moves in.

More serious than inadequate roads to drill sites is the lack of uniformity in state laws governing loads, vehicles and highway permits. Drilling contractors have endeavored to persuade state officials to adopt a uniform hauling code, but without success. Attempts have even been made to interest the government in adopting federal legislation on the subject but such efforts have been blocked by the individual states. Because of the diversity of hauling equipment, laws are constantly violated, penalties and fines paid by truck owners and in turn passed along to the contractor. Since these charges occur after he has submitted his bid, he must absorb them.

Recently an Oklahoma contractor sent a truck and trailer into Texas to haul a piece of oil field equipment. While his trucking equipment which was 46½ feet in over-all length, conformed to Oklahoma highway laws, he had to pay a fine in Texas where the law permits an over-all length of only 45 feet.

On the other hand Texas charges only $5 for a permit on loads which exceed the legal limit and on overlength and overheight hauling equipment. The permit is good for one trip and trucks and trailers are routed by the state highway department. While in Oklahoma the same permit can cost as much as $190 as was the case of one drilling contractor who had to pay this amount for a permit to move a mud pump from the Elk City field to Oklahoma City. This represented twice the actual hauling charge by a trucking contractor. The same drilling contractor owns a tractor and bulldozer and must pay a penalty of $5 per thousand over the maximum load which, in this case, amounts to $70 overweight and $5 overwidth penalty every time he moves the equipment from one location to another.

Oklahoma Law. Oklahoma has a law which requires that a "mileage cab card" be posted on the windshield of all trucks. This is to insure that the truck operator pays a state tax on the gasoline purchased outside Oklahoma. In the case of a move from Kansas to Oklahoma, the truck operator pays a 5-cent-per-gallon tax on the gasoline purchased in Kansas and if he has any Kansas gasoline left in his tank he must pay an additional 6½ cents per gallon tax to Oklahoma.

Commenting on the lack of uniformity in state laws governing the operation of trucks on highways, resulting in inconsistencies and inequities, one drilling contractor who has studied the problem, stated that many laws on the statute books were enacted by legislators who lacked understanding of the problems involved.

"Truck operators and drilling contractors are as much to blame as the legislators," he said. "What is needed are competent representatives to observe legislatures at work and to advise legislators on the problems of the oil industry whenever legislation affecting the operation of trucks on the highways comes before them. In the final analysis, since the federal government declines to codify such laws, it is up to the various states to get together and bring about uniformity in legislation affecting the operation of trucks on highways so that there is 'one law for all' and there is no further discrimination between states."

Drilling contractors, as a general rule, hire outside trucking contractors to move their equipment and in this connection the wise contractor will do well to be careful in selecting the firm or individual who is to do this work.

The careful contractor not only checks into the financial stability and equipment capacity of the hauler but pays close attention to hauling rates which often differ by a considerable margin. One Oklahoma contractor found a difference of 8 cents per 100 pounds between the highest and lowest bid on a job involving hauling a load of casing from Houston to Oklahoma City.

Insurance Pitfall. Contractors are likely to run into serious trouble if they fail to check into and ascertain that their trucking contractors carry cargo insurance. This is expensive insurance and many trucking companies neglect to carry it. While serious highway accidents are rare and drilling equipment being rugged may escape serious damage, accidents do happen and valuable equipment can be destroyed or damaged. Lack of cargo insurance often results in costly lawsuits with the contractor frequently on the losing end.

Another item which, if not carefully checked beforehand, may result in additional expense to the contractor, is that of mileage. The distance equipment has to be hauled often governs the rate to be paid, and unless a specific understanding is had before the move, since rates change every 10 miles, a hauling contractor may, by adding 1 or 2 miles to the distance, increase the rate 2 cents per 100 pounds or even more. Since most drilling equipment weighs in the thousands of pounds, this item can prove expensive to the drilling contractor.

Hauling contractors are generally required to charge for what is commonly known as the "short line mileage" which means the shortest distance from point of origin to destination. With the exception of permit loads, the hauling contractor may cover only the distance specified in the permit issued him by a state highway department. A good method to check mileage is to determine it from the point of origin to the first incorporated town, thence to the last incorporated town before reaching its destination, and both drilling and hauling contractor or their representatives should agree beforehand that the mileage shown will be charged for, and thus establish the hauling rate per 100. Over a period of time this practice can save the drilling contractor considerable money on his hauling bill.

—The End

The drillers who operate rigs day in and day out are the men who can give you the real facts about draw works. Drillers with experience on the Model U-34 Draw Works will tell you of the convenience of the single lever throttle and clutch control, the smooth operating clutch, the dependable Hydromatic brake, and the many other features that make drilling faster — safer. Ask the driller on any UNIT RIG Draw Works why UNIT RIG is your best draw works buy.

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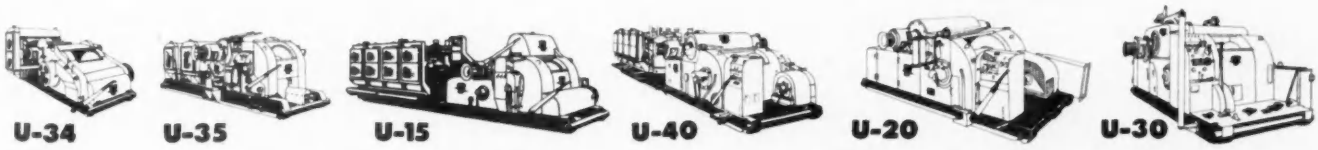

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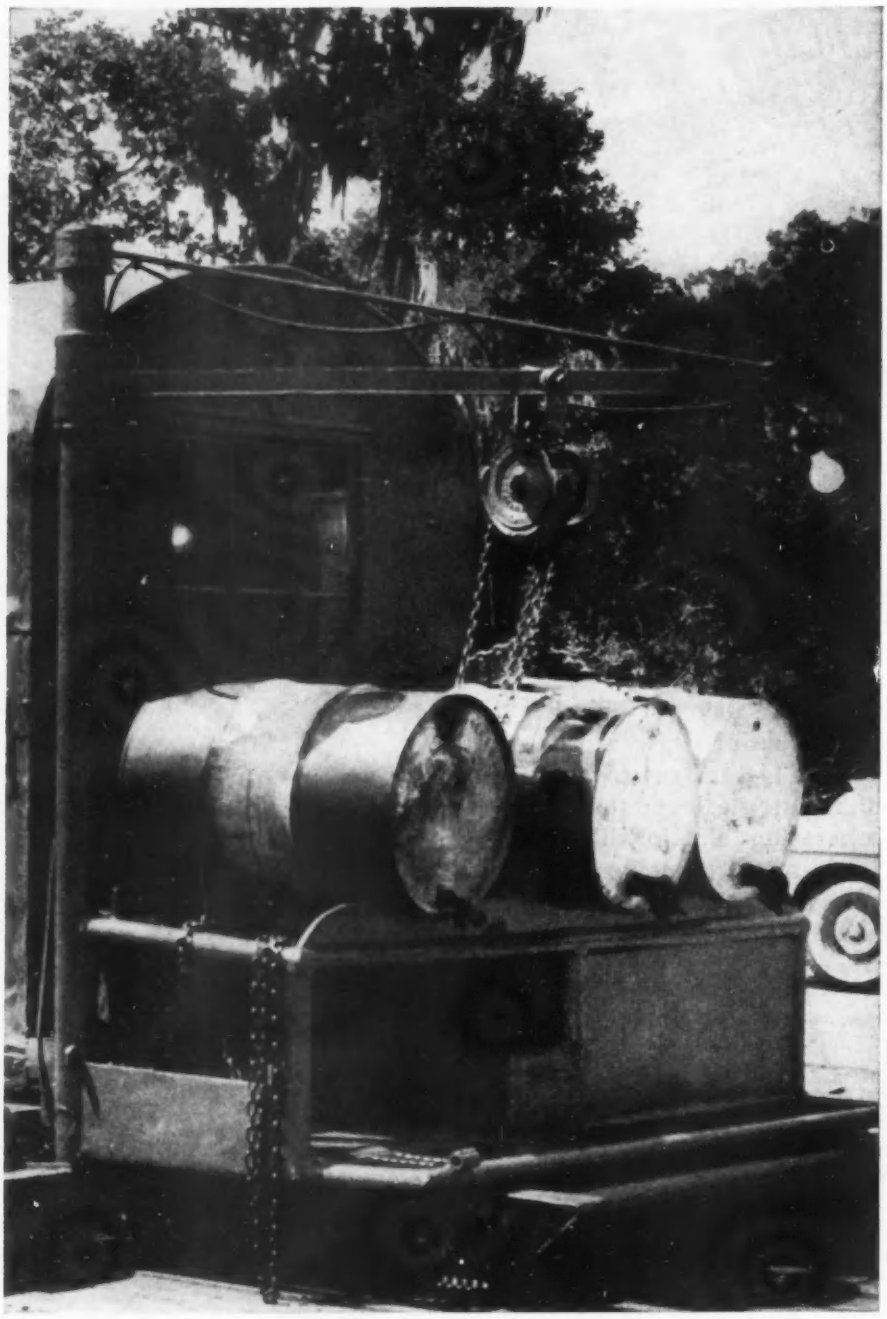
DRILLING HINTS



Hoisting Oil Storage Drums Safely

Build a support for oil drums from scrap steel and two-inch pipe on the back of the doghouse skid and equip it with a monorail and movable chain hoist to take the hard work out of handling oil drums.

Weld the stanchion of extra heavy four-inch pipe to the skid base. Affix an I beam monorail at the upper extremity so that it will revolve on a machined built up stanchion section. Brace it with a three-quarter-inch sucker rod. Barrel chimes, used in conjunction with the hoist, will save many backs. An electric light is provided as an extra convenience.

Fishing By New Method

A rather unique fishing job was recently tried in West Texas. Going into the hole, a ledge was hit about 2500 feet off bottom. The hole was at a depth of 8000 feet. When the ledge was encountered, the drill collars and drill pipe stuck. The contractor went down to back the collars off and dropped some junk inside the collars. Because of the junk, the crew was unable to get back down inside collars with a string shot to shoot collars off. Neither could they back the collars off, so they had to go in to the hole with a small bit in an attempt to drill up the junk inside the drill collars—a fishing technique which has been done but few times.

Unable to drill up the junk, it was necessary to go into the drill collar with a magnet. The junk was fished out of the hole and the crew went back with a small bit, finally drilling down to the bore of the collar to the bit. They were able to back off the drill collars to about eight above the bit. At that point, the drill collars were stuck—here they starated washing over.

Making Vertical Ladder

Construct a ladder which will not topple backwards, even when used in a narrow space requiring it to be positioned vertically.

To any metal ladder of conventional design, weld 12-inch lengths of scrap, locating them in pairs between each rung, as pictured.

HERCULES® Red-Strand wire rope?

Why indeed. Aren't all wire ropes alike? They look alike. Why should you choose HERCULES Red-Strand rather than any other?

The answer would be easy if you could discover by *feel* why HERCULES Red-Strand performs so well. Or if you could see, or hear, or taste the *special quality* that makes users praise it so highly. But you can't. Wire rope isn't like that.

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Usually you become aware of the consistently high performance of HERCULES Red-Strand by hearing users praise it . . . or by using it yourself and checking results.

Then you realize there must be *something special* about this rope. And you are right. *There is.*

What is this something special?

It is partly the result of generations of specialization. Leschen is concerned *entirely* with making wire rope. Nothing else. No other processes or activities interfere.

It is partly Leschen's 97 years' experience and Leschen's natural ability to make good wire rope . . . which has resulted in several major "firsts" in the development and most efficient use of wire rope.

It is partly pride of craftsmanship . . . from policy to engineering to finished rope. It is the effort always to make HERCULES Red-Strand *better than we claim it to be.*

In a word, it is *quality* . . . higher-than-rated quality. This is the *something special* in HERCULES Red-Strand wire rope that means *longer-than-expected* service . . . year in, year out.

It *pays* to choose HERCULES Red-Strand. Use it and see.

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MODEL 310-A EMERGENCY JACK
with four-way lift power

1. On the rotating cap.
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3. On the machine corrugated toe.
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Model A-1022 Ratchet Lowering Jack has aluminum housing which reduces weight to 42 lbs. Capacity 10 tons.

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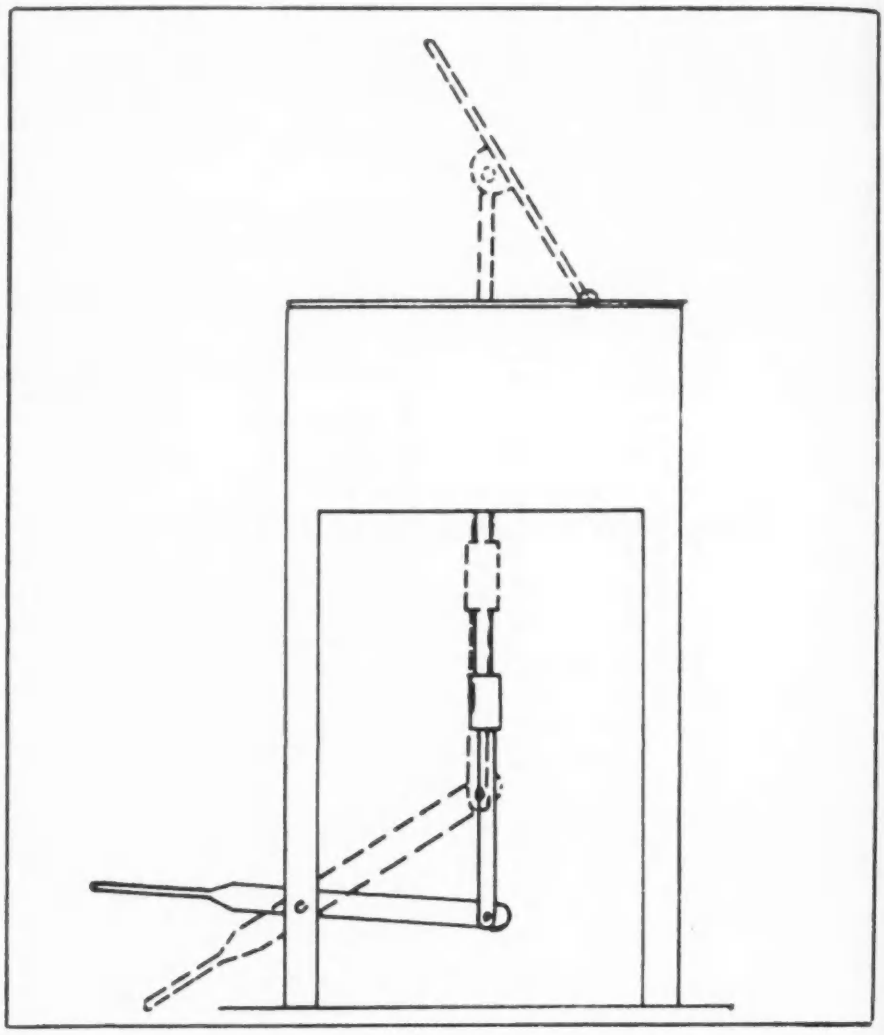


Protecting Tool Joints

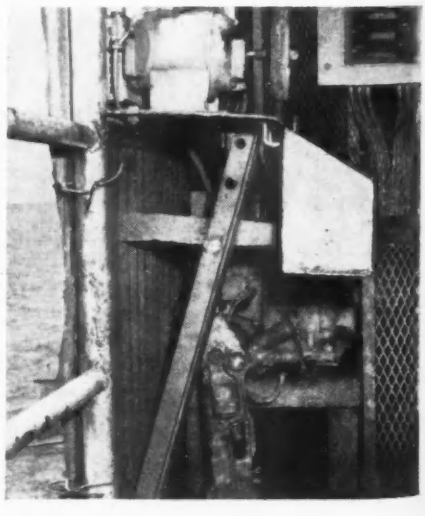
Earl Walker, drilling superintendent for Rowan Drilling Company, has constructed a pipe dope container which is paying off in savings by preventing waste of lubricant and protecting tool joints.

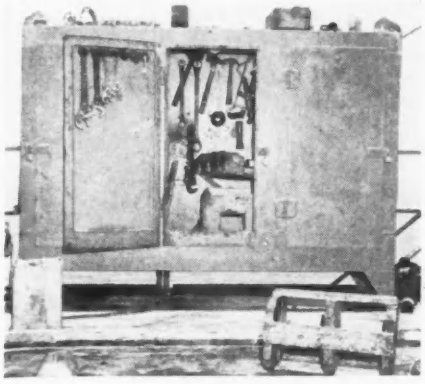
This container is covered by a firmly fitting lid which can be opened by pressing a foot pedal. When the pedal is released, the lid closes. The dope brush protrudes at all times and is ready for instant use. In the closed position, dope is protected from sand, mud or other foreign matter which might be injurious to tool joints.

Making Motor Shelf

When shelf space is at a premium, make a permanent niche for your motor, complete with bin for emory wheels and the like.

Weld a waist-high length of angle iron into the V position shown, supporting the scrap metal upon which the motor is to rest. Affix to the front a hook to hold the bin which is also made of scrap metal and cut and welded to present a sloping aperture for convenience.



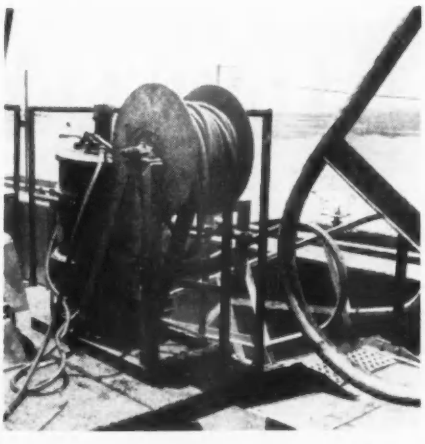


Preventing Tool Loss

Prevent the loss of tools by firmly fixing the responsibility for their safe keeping.

Make an all-welded tool chest, as shown, or divide any other stout chest into three compartments. Store duplicate tools in each compartment. Provide each with differing padlocks and give a key to the driller on each of the three tours. Each driller locks his compartment after checking the tools for which he is responsible.

A chest such as the one illustrated is placed on each of the rigs owned by one of the nation's largest drilling contractors.



Expediting Grease Jobs

Expedite grease jobs, safeguard the hose, and remove a hazard to crewmen by spooling the hose on a framework that also houses the grease barrel in one easily portable unit.

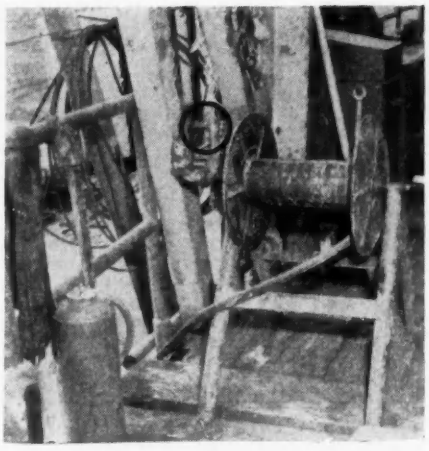
To a rectangular base, weld a nest for the grease barrel and an inverted V upright upon which to rest the spool for the hose. By locating the unit advantageously and using a sufficient length of hose, a crewman can employ the gun at any point on the rig without unduly interferring with the work of others.

Reeling Washdown Hose

Make a steel frame to hold a steel reel and protect the expensive washdown hose by reeling it on the spool.

One company in New Mexico has connected the water line into one end of the axle of the spool and fitted it to the hose, passing through a hole in the drum as pictured. The hose is reeled out to its desired length, the valve (see circle) is opened and the water is immediately available for washdown purposes.

Crank at right is used to reel in the hose after use.



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IN LOST CIRCULATION PROBLEMS

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The William E. Sievers Corporation and Sievers Company internationally specialize in "Lost Circulation". Their variations of applications, special injection equipment, complementary chemicals, mixtures and processes certainly have caused "An AMELIORATON" in the perplexing lost circulation problems. Their services are available at your inquiry.

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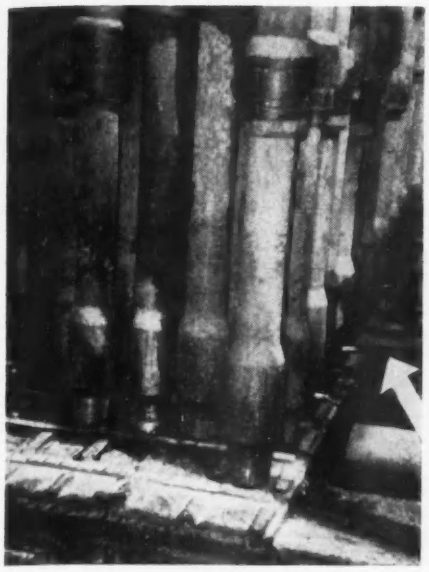
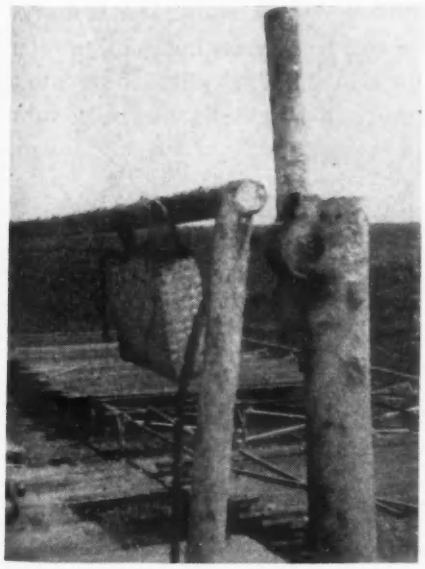


Standing Drill Pipe

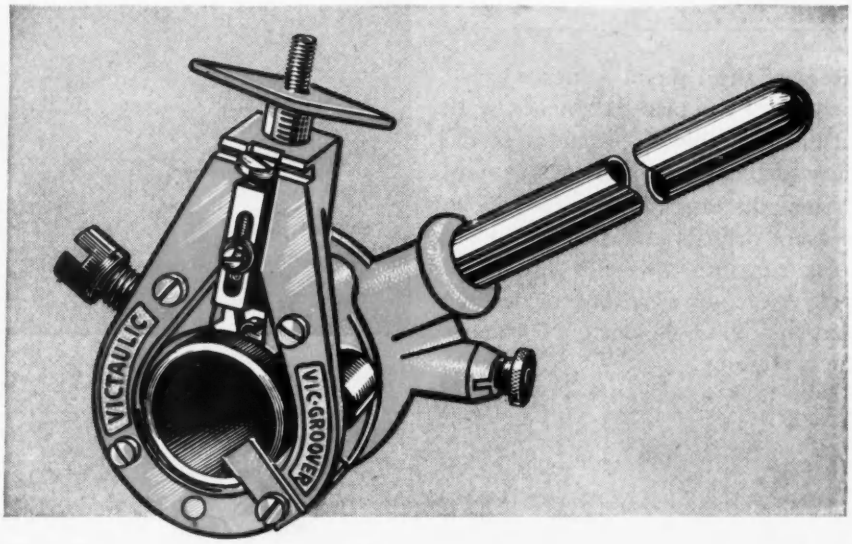
Rack drill pipe safely by providing a base on which to stand the pipe. Also the wear and tear on the derrick floor by this operation can be nullified.

The illustrated stand is made from a large square piece of heavy sheet metal. Make partitions by laying strips of weld parallel to the sides of the base. Provide a keyhole (arrow) on the side of the stand to facilitate moving.



Mounting Tape Holder

Mount a steel box for the steel tape on the derrick rail and prevent tape misplacement. Weld from small



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pieces of sheet metal 4 inches by 12 inches and two pieces 12 inches by 12 inches. A keyhole is provided in the back for hanging the holder.

Since the tape is used primarily to measure drill pipe and casing before being run into the hole, this receptacle can provide convenience by being placed on the derrick floor near the pipe ramp.

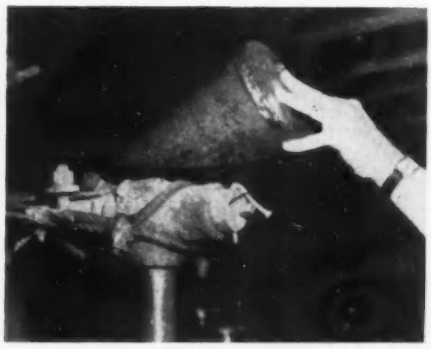


FIGURE 1

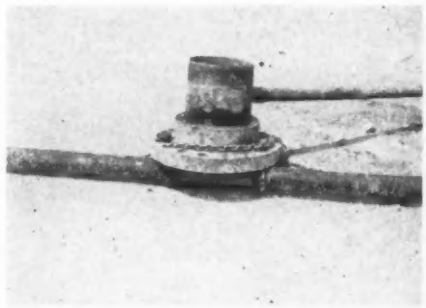
FIGURE 2

Covering Shear Pins

Protect hands by covering the nails serving as mud pump shear pins and the accidents prevented will pay for installation.

Cut a section of pipe as shown in Figure 1. Weld a steel plate to cover the end, hinge it so that it can be bolted to discharge line with U-bolts. This method is employed by Glasscock Drilling Company of Corpus Christi.

Another method that has been used by a New Mexico operator is that of using a heavy duty bull plug to cover the nail. The bull plug screws into a short collar welded to the relief valve in Figure 2.



Breaking Out Nipples

Leave it to a roughneck to find an easy way to tackle any problem. West Texas crews have devised a method

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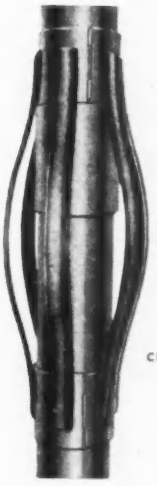

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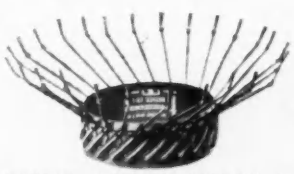

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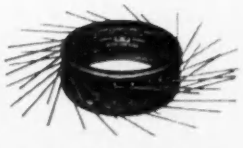

Apparatus and method of usage covered by U. S. Patents — 2,338,372; 2,374,317; 2,392,352; 2,506,405; 2,628,682; 2,634,813. Other Patents Pending.

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of "breaking out" stripper nipples from flanges.

Run a chain through the stud holes in the flange, wrap the chain around a two-inch water line, screw a two-inch pipe as a cheater in the overflow outlet and walk pipe cheater around until the nipple breaks out.

Care must be exercised to bolt holes, nipple and water line but the method has been effective.

Increasing Leverage

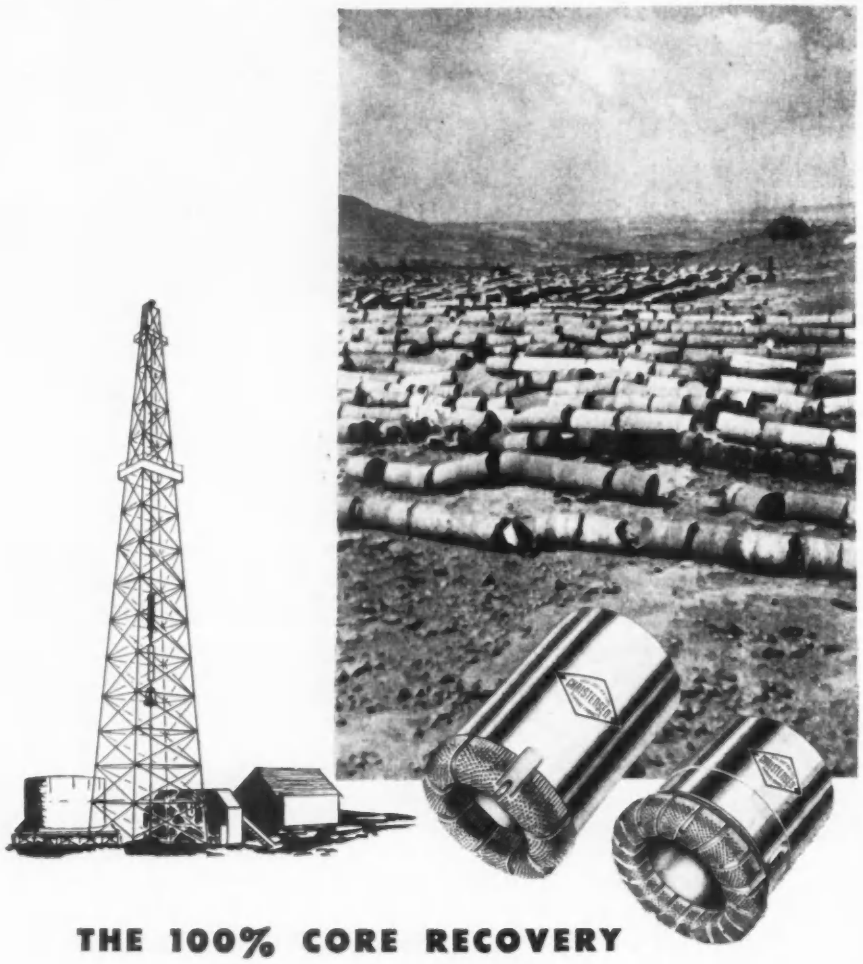
Increase leverage on valve connections by using an oversized valve wheel or affixing an auxiliary turning device.

One Gulf Coast contractor uses both methods. When the oversized wheel is used, as pictured at left, it is kept handy but put out of harm's way by suspending it from the shaft with a length of sturdy wire bent into hooks at either end.

Leverage may also be added as shown in photo at right by welding or wiring to a small valve wheel a bolt bent at a 90-degree angle.

Drying Clothes

Cleaning and drying clothes are problems for roughnecks everywhere. If proper engine circulation is maintained and if there is no danger of overheating engines, clothes can be effectively dried by using the engine radiator as a dryer.



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ON-THE-SPOT CHECK. Indirect heaters and many other items of oil field equipment will be dismantled so that corrosion can be observed first hand by members of the National Association of Corrosion Engineers at the 1953 Corrosion Tour, September 30 through October 2. Headquarters will be in Odessa, Texas.

Field Tours Highlight West Texas NACE Meet

Engineers will get a chance to see results of corrosion mitigation first hand Sept. 30-Oct. 2.

EFFECTS OF CORROSION on more than 70 installations of oil field equipment will be shown on location when the 1953 Corrosion Tour gets under way September 30 through October 2 in West Texas. Sponsored by the Permian Basin Section of the National Association of Corrosion Engineers, and through the cooperation of oil companies and suppliers, the 1953 tour which will headquarter at the Lincoln Hotel in Odessa, Texas, is expected to be the most outstanding meeting held thus far.

Last such meeting was held in 1951 when representatives of oil companies, manufacturers and service companies from 38 states and three foreign countries signed up for the corrosion tour. General arrangements for this year's meet will be similar to those of 1951, and many of the same pieces of equipment inspected then will be reviewed again. Many of the installations now have six years of mitigation history behind them, and those present will have the opportunity of seeing first hand the effects of the mitigation programs.

Conducted tours have been arranged with oil operators in the area so that as many installations as possible will be viewed. Tanks and pumps will be opened up, pipes and sucker rods exposed, and a complete refinery tour conducted. In all, more than 14 different types of oil field equipment will be seen, including tanks, troughs, casing, sucker rods, pumps, well headers, pipe lines, heaters, flow lines, tubing, injection equipment, slip sleeves, corrosion coupons, treaters and a refinery.

Equipment will be exposed on both the inside and outside. Effects to be observed are scale, corrosion, peeling of protective coatings, paraffin accumulations, good resistance and protection of metal parts. Such first-hand inspection gives the viewer a chance to evaluate the effects of plastic coatings, galvanized coatings, cement lining, alloy lining, alloy pipe, plastic pipe, inhibitors and cathodic protection.

This type of meeting is different from the conventional meet in that most of the time allotted is spent in inspecting actual field installations which are selected to demonstrate a wide variety of corrosion on many different pieces of oil field equipment. At each installation, representatives

NACE OFFICERS of the Permian Basin Section look over plans for the tour. Left to right are: John Knox, secretary-treasurer; Thomas Newell, chairman; Lamar Sudduth, steering committee, and E. O. Kemper, first vice chairman.

CASING CORROSION. Typical of the exhibits to be inspected is this corroded casing. This picture was taken at the last meeting held in 1951.

of the operators involved will review the problem, discuss what was done, and point out the effects obtained through the mitigation program used.

Barbecue and speakers. The three-day meet will include dinners where outstanding speakers will discuss the exhibits visited and will answer questions on the corrosion problems involved. An outdoor barbecue will be served during the meet. Small portable equipment used in corrosion work will be exhibited the last night of the meeting.

The Permian Basin corrosion tour is an outgrowth of widespread problems on corrosion in West Texas. In January of 1949, an oil company sent a corrosion engineer to the Permian Basin to study corrosion of oil field tanks. This man spent six months talking to operators drawing full salary plus liberal expenses during this time. He got to see the inside of just three tanks.

In October of 1949, he went into nearly 30 tanks in just three days, for that was the first tour conducted. In October of 1951, he saw 70 exhibits of corrosions of nearly all types of oil field equipment including 35 oil field tanks. The first corrosion tour was held in October of 1949 and it drew considerable attention at that time. Since many operators are interested in different phases of the corrosion problem, such an idea of touring field installations prove to be attractive to them all. Since that early beginning in October, the corrosion tour program set up the Permian Basin section of NACE has grown in interest and in subject matter considered.

The 1953 officers of the Permian Basin Section responsible for the 1953 corrosion tour are: Thomas M. Newell, chairman, Cardinal Chemical, Inc., Odessa, Texas; William A. Hopwood, second vice chairman, TNEMEC Company, Inc., Odessa, Texas; E. O. Kemper, first vice chairman, Permian Enterprises, Inc., Odessa; and John A. Knox, secretary-treasurer, The Western Company, Midland. Steering committee for the corrosion tour includes Thomas Newell, E. O. Kemper, John C. Watts, Humble Pipe Line Company, Midland and Lamar F. Sudduth, Stanolind Oil and Gas Company at Midland.

Unusually complex emulsion problems in the Ventura field of California were solved by this . . .

New Wash Tank Design

By ARTHUR R. WILLIAMS
Shell Oil Company, Ventura, Calif.

A 10,500-BARREL wash tank was designed and constructed based on a pilot chemical dehydration unit which showed that the dominant factors are temperature, chemical injection rate and wet oil throughput rate. Tests conducted on the full-scale plant confirmed results of the pilot plant tests. This new wash tank design grew out of the magnitude and complexity of the dehydration problem on the Taylor lease in the Ventura Avenue field of California.

Production from the Taylor Lease is 30-degree API gravity crude coming from depletion-type sands of Pliocene age. It is in the form of water in oil emulsion and, because of the low cut of many wells, a dual oil collecting system was employed on the lease. Oil which is acceptable for pipe line delivery is collected in a system which gravitates into the lease stock tanks, while that which is too wet for acceptance is transported through a wet oil system to the dehydration plant.

Production in the Ventura field is from many zones and fault blocks. Drilling and development are progressing on the deeper horizons with the development in the shallower zones nearly completed. This condition is changing the composition of the stream to be treated. In an attempt to evaluate the effect of this change on the treating problem, laboratory tests of treating difficulty were conducted on samples taken from several typical wells in each of the larger zones.

Test results for wells in each zone were compared and found to be consistent. The test consisted of adding varying amounts of chemical to the emulsion samples, mixing and heating. The sample which was cleaned to 1 percent water with the least amount of chemical was considered the limit for the well being tested. Minimum chemical addition rates of approximately 4.5 pints per 100 barrels were placed on these tests. Some of the more easily treated zones were rated the same in the results.

Results of these tests are shown in Figure 1. It is interesting to note that the difficulty of treating increases with depth and zonal pressure. This can possibly be explained by the effect of throttling through the wellhead control equipment. If pressure drop at the wellhead emulsifies the oil and water in the production, it will increase the treating problem. This theory has been partially confirmed by another test in which a pressure vessel was installed between the wellhead and the bean or control unit.

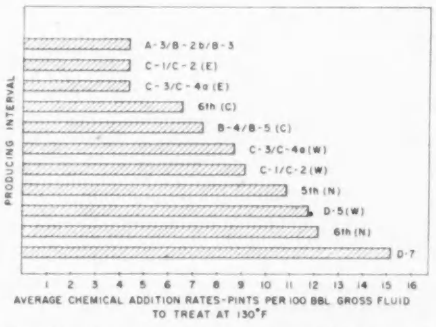

Fig. 1—Comparative treating difficulty of major productive zones in Ventura field.

Part 1

After the well had produced through this expansion tank for a period of approximately two weeks, free water could be bled from the bottom of the tank, although tests did not reveal any free water present in the production downstream of the bean at any time during or after the test.

In addition to providing a better understanding of the future dehydration problems on this lease, these zonal tests provided a basis for the chemical manufacturer to develop a new, improved chemical formula.

Results of field tests with this chemical have been very encouraging, although comparative tests have been limited to small leases in the field where a history of previous chemical performance was obtainable.

Wash tanks on other leases in the field were installed on the basis of rules and practices developed over years of experience in other fields. These plants were not large by comparison with the requirements on the Taylor lease but were overdesigned for their particular leases to insure against difficulty from the many unknown variables in wash tank operation. Were an installation to be made on the Taylor Lease with these same factors of safety or overdesign, it would be economically non-competitive. With this background, it was decided to construct a pilot-size chemical dehydration plant on the Taylor lease and check performance while varying each of the known factors affecting wash tank operation.

Pilot Tests. The pilot plant was designed such that it could be used for future tests on outlying leases. The unit (Figure 2), consists of a 65-barrel, skid-mounted wash tank complete with fluid spreader, water leg and gas boot. Also mounted on these common skids are equipment for chemical storage and injection, plus piping and manifolding for a completely unitized operation. A portable heater can be transported on these skids and, in conjunction with two rectangular 250-barrel storage tanks, the three packages provide facilities for testing outlying or wildcat wells.

Two samplers (Figure 3) were incorporated in the tank design and installed so that fluid could be withdrawn from virtually any desired level.

Initial tests were conducted at widely-varying throughput rates as well as widely-varying tem-

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Short haul: Sucker rods pallet mounted, 4 lateral braces bolted to truck bed.

Long haul: Sucker rods pallet mounted, 4 lateral braces bolted to car bed, and metal strands guyed to prevent shifting.

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peratures and chemical addition rates in an attempt to determine the operational limits for the test. The practical upper limit, as it concerned throughput rates, was approximately 110 barrels per day, based on a 1 percent cut of the output fluid and the temperature and chemical requirements. With the throughput rate held constant, it was possible to test and evaluate the effectiveness of other variables or appurtenances.

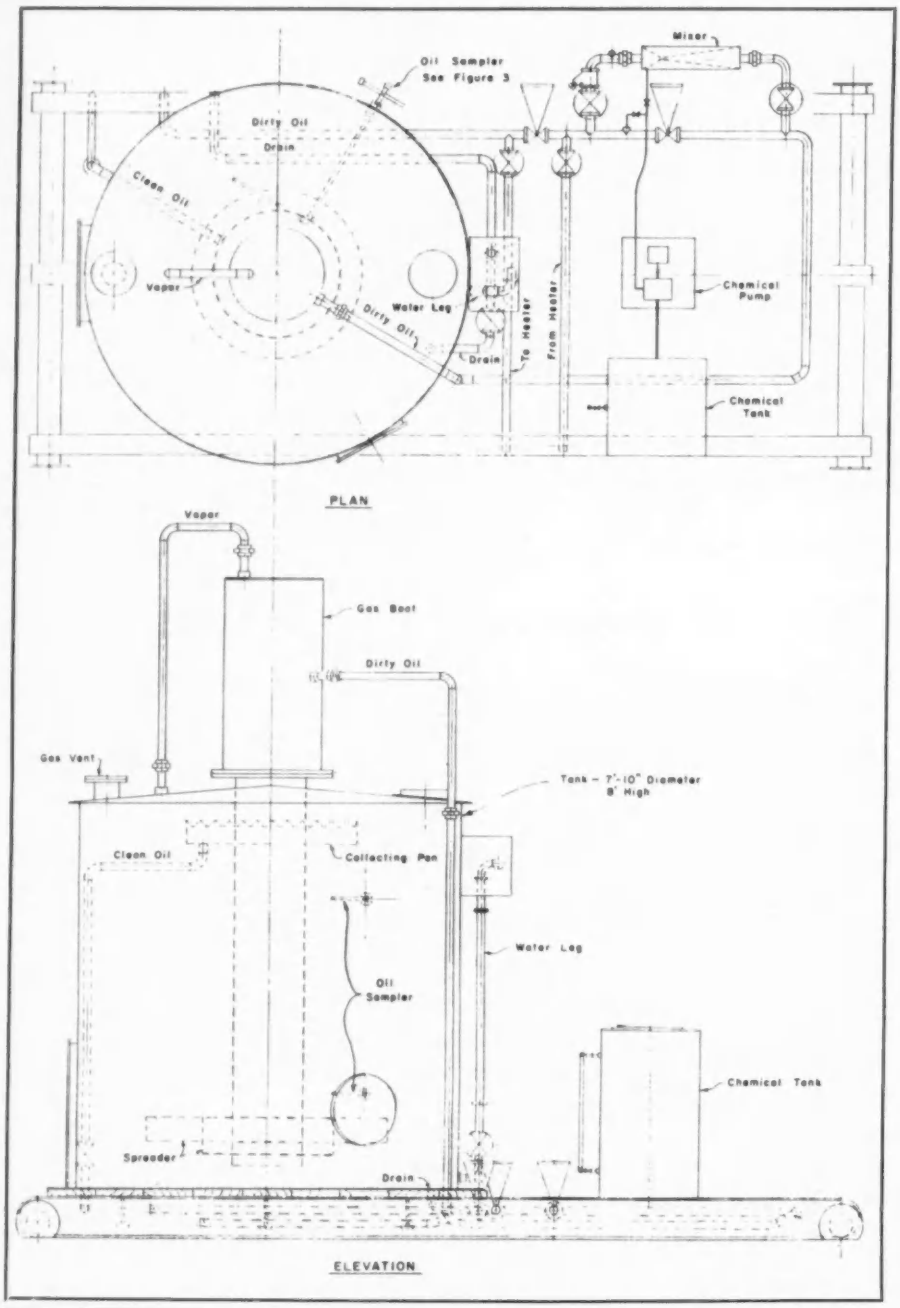

Fig. 2—Pilot dehydration plant (above).

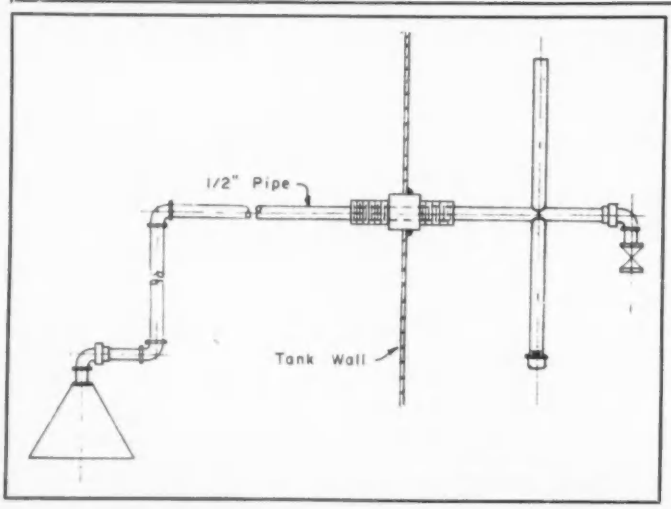

Fig. 3—Oil sampler (left).

A positive displacement rotary-type pump was used to pump the wet oil into the test unit for a portion of the test and a gravity flow was used on the balance of the test. Results of the test indicate that a positive displacement pump does not increase the difficulty of treating this emulsion. If a positive displacement pump is used in connection with a wash tank, it is desirable to include a surge tank on the suction line to compensate for normal fluctuations in production during the 24-hour period.

Method of Heating. The next comparison was made between a line-type heater and heating the fluid in the tank. These methods of heating appear equally effective. Other factors may influence the selection of one method over the other. Use of a direct-fired heater will generally give a higher efficiency than other methods, although creating a greater fire hazard, and the pressure drop through this type heater may require circulating pumps on the stream to be treated.

Advantages of heating the fluid in the tank occur primarily on small leases or where gravity flow exists. On a small lease where a cessation may occur in the flow of wet oil, the heat exchanger in the tank will automatically compensate and there will be less danger of fire.

On this type of lease (or where curtailment may require periodic shutdowns of the lease), use of heaters in the wash tank provide a means of starting the process of heating oil in the dehydration plant before the wells are produced.

On the Taylor lease, the tank-type heating method was chosen because of the pressure drop required with a line-type heater and a gravity system could be used if this pressure drop were avoided.

Method of Spreading. A problem in the design of wash tanks has been the type and use of spreaders or distributors on the wet oil stream. Purpose of this distribution system is two-

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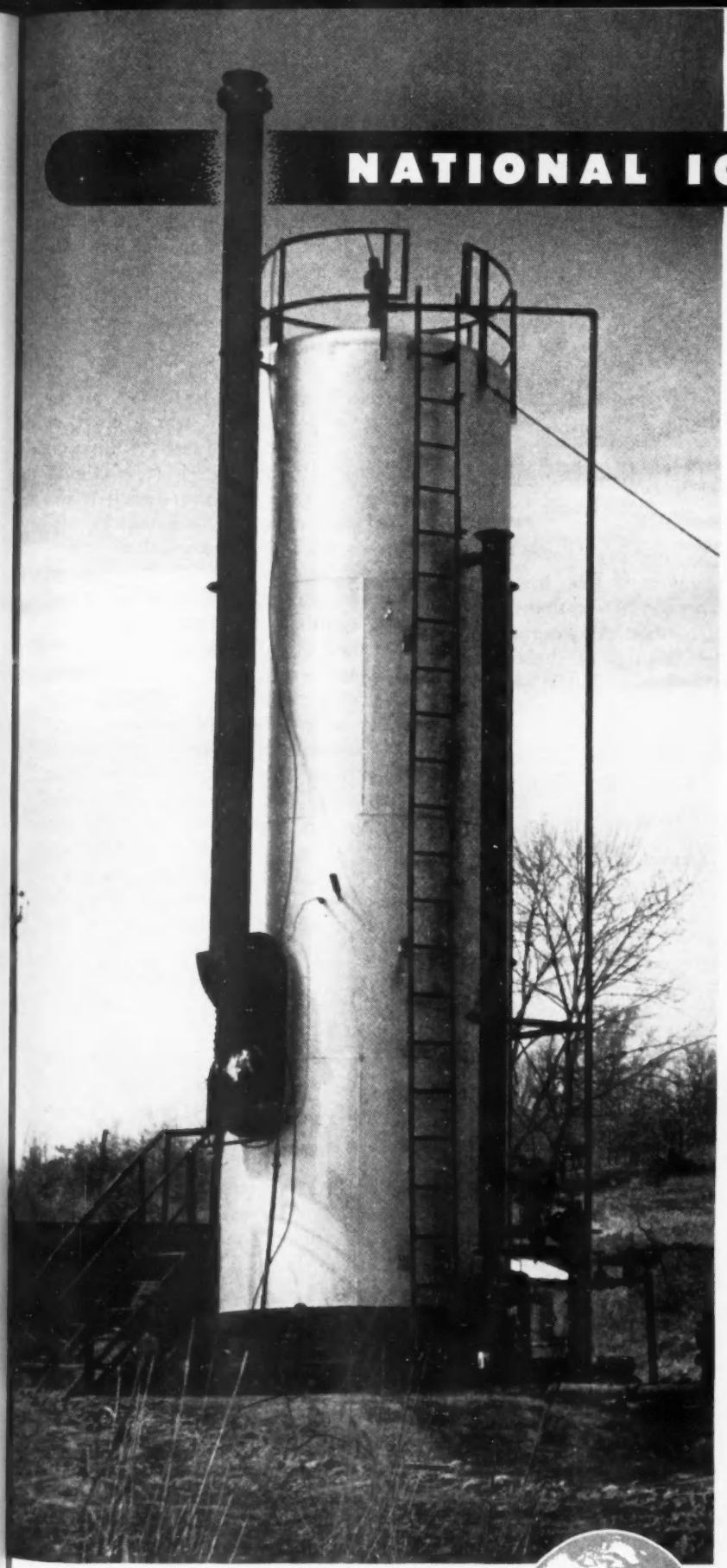

HANDLES
776,920 BBLS. OF OIL
823,486 BBLS. OF WATER
IN THREE YEARS

This 8' x 27'6" National IC-P Treater was set on a lease in Hughes County, Oklahoma. In approximately three years, this Treater handled 776,920 bbls. of oil, with a substantial increase in conserved gravity, and 823,486 bbls. of water. At times, rate of crude flow through the Treater was as high as 3400 bbls./day when wells were at peak production.

Average treating temperature is about 140°. Approximately 1 quart of chemical is used per 100 bbls. of oil. During this three-year period, tank bottoms were never cleaned or treated.

Present daily production is 1742 bbls. of 36.4 gravity oil and 3138 bbls. of water per day. This excessive amount of water has required the installation, recently, of a National Free Water Knockout.

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fold: (1) to spread the emulsion evenly and as quiescently as possible over the area of the tank, and (2) to disperse any droplets of emulsion. It is difficult to accomplish both of these requirements, since they tend to conflict.

A recent model spreader, as shown in Figure 4, uses a stainless steel expanded metal for the rims or skirts.

Louvers of the expanded metal are mounted such that the flow is directed downward and the emulsion droplets tend to be broken. Although this type of spreader had achieved considerable usage locally, it appeared that some other more effective method of spreading would be required to effectively utilize the area of a large tank.

First consideration was the addition of perforations in the horizontal portion of these pans, but experience indicated that sand in the production would quickly plug any such perforations. To partially prevent this plugging, an inverted cone spreader was designed, as shown in Figure 5. Two difficulties with this design became apparent.

The angle of repose of the solids is approximately 40 degrees and in an operational size tank, a cone of 40 degree angle would sacrifice too large a portion of the tank. Size of holes required to pass the anticipated quantities of fluid in a well-distributed pattern was calculated to be so small that the holes would quickly plug with sand and wax. When the hole size is increased, the distribution is somewhat limited. However, a spreader was constructed on these principles and tested.

Size of hole was held constant at ⅜ inch diameter and the spacing was varied to theoretically distribute the fluid evenly over the area of the tank. This ⅜-inch hole size was considered the minimum size allowable to prevent plugging.

An interesting feature of laboratory tests of the flow through a cone spreader revealed that the emulsion tends to cling to the top surface of the cone after passing through the holes and will continue to follow the cone to the center column and rise along this column. To prevent this effect, the cone spreader tested had baffle rings installed as shown at intervals on the top surface to break the fluid away from the spreader.

Test results with this inverted cone spreader indicated that this method was no more effective than the pie-pan stage method. An examination of the design features of the cone-type spreader indicated that it would encounter operational difficulties more frequently than the pan-type in a large tank. Therefore, the cone spreader design was discarded after the pilot test.

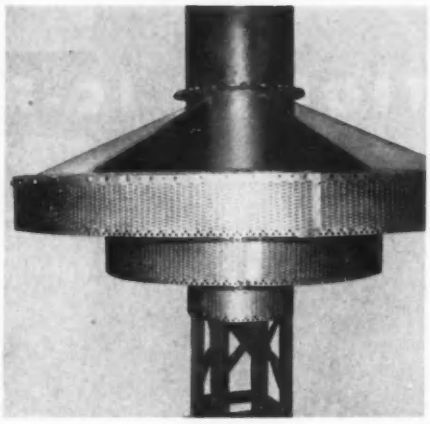

Fig. 4—Stage spreader with louver openings.

Adding Chemicals. Chemical was formerly added to the wet oil stream at the wellheads of the individual well. In a field, such as Ventura, where there are several hundred wells involved, the control of the chemical usage under this method is costly. Central units have been installed to handle entire leases. A deviation from this centralized addition method may be warranted in fields where there are waxy substances in the production since the injection of chemical at the well head may result in a reduction of flow line pressure drop due to the water knockout and subsequent effects of handling some free water with the oil instead of an emulsion.

To evaluate the effect of the point of chemical addition by the use of the pilot plant, the injection point and method of injection were varied. With other variables held constant, the chemical was added upstream of the line heater and was mixed through approximately 250 feet of line plus the coils in the heater and then the injection point was moved to the inlet of the tank. No appreciable advantage was noted with the added mixing time.

A mixer was installed in the emulsion inlet line whereby the chemical was injected through a small tube protruding into the center of the turbulent flow in the throat of a nozzle. Results of this test were not conclusive. However, it was found that the pressure drop required to obtain turbulent flow excluded this equipment from use on a gravity flow system such as the Taylor lease. The emulsification effect of turbulent flow possibly offsets any benefits of the improved mixing.

Wash Water Level. Wash water level in the pilot tank was adjusted at various levels to evaluate its effect on the dehydration process. Results indicated that the emulsion pad between the oil and water was only a few inches thick under normal operating conditions, and that the cut of an oil sample taken six inches above this pad was approximately equal to the cut of the fluid at the tank outlet.

These results were confirmed when the water level was raised in the pilot tank. The tank volume above the water level is only safety storage to provide the time for the operator to adjust to changes in operation. This safety storage is of questionable value since it was observed from the tests that, once the emulsion pad commenced to become thicker, it would build up to the tank outlet at the rate the clean oil was being displaced above it and all dehydration ceased.

There are two possible explanations:

(1) The emulsion pad will not start to increase without a change in conditions and, normally, these changes are not arrested before the entire process is interrupted.

(2) As the pad starts to form, it becomes a barrier for the clean oil and, as such, it tends to emulsify the clean oil that would otherwise rise to the outlet.

Once a wash tank has ceased to function, it may not be possible to restart the dehydration process by merely re-establishing the normal operating conditions. It is recommended that an over-compensation of heat and chemical be applied for a period of time equal to that required to displace the volume of oil in the wash tank. Results of these tests indicate that an eight-foot high wash tank would theoretically be adequate for dehydration if no factor of safety were desired. Most wash tank operations require that the clean oil gravitate into stock tanks, which, in normal

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The BIW PX-350 is an efficient and economical method for suspending tubing on completion and, later on, for working over the well or putting it on pump. The Tubing Head can be converted readily into a threaded hanger suspension-type tubing head, a slip suspension-type pumping head, or it can be equipped with a gas lift hanger.

Figure 2 shows the construction of the heavy duty Neoprene stripper. This stripper permits running and pulling tubing without the use of additional blowout preventer equipment. The one piece rubber packoff is molded into a steel spider ring to prevent stripper motion while the tubing is being raised or lowered. Tubing collars are passed readily; well pressure is sealed in effectively.

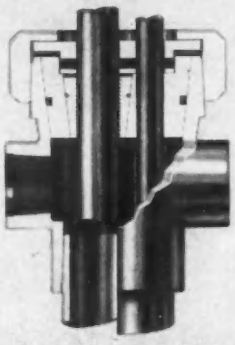

Figure 1 — Tubing Head with Gas Lift Hanger.

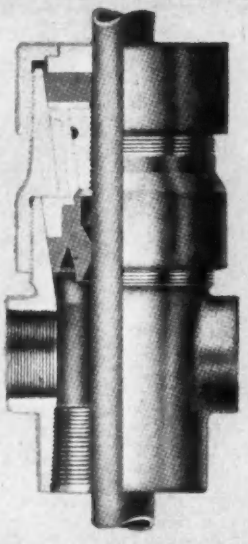

Figure 2 — Stripper Type Tubing Head.

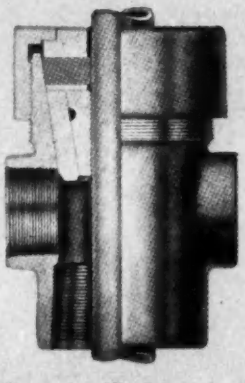

Figure 3 — Slip Suspension Type Pumping Head.

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The head, as shown in Figure 1, can be converted to a gas lift head by removing the stuffing box assembly, slips, slip bushing, slip bowl, and stripper assembly, and substituting a gas lift hanger. The gas lift hanger utilizes slips for suspension or the gas pipe and is threaded for the tubing connection.

The ease of conversion to an efficient pumping head is shown in Figure 3. The stripper assembly and slip bowl are removed. The slip assembly is seated in the body of the head, and the stuffing box is made up on the body of the head instead of on the slip bowl.

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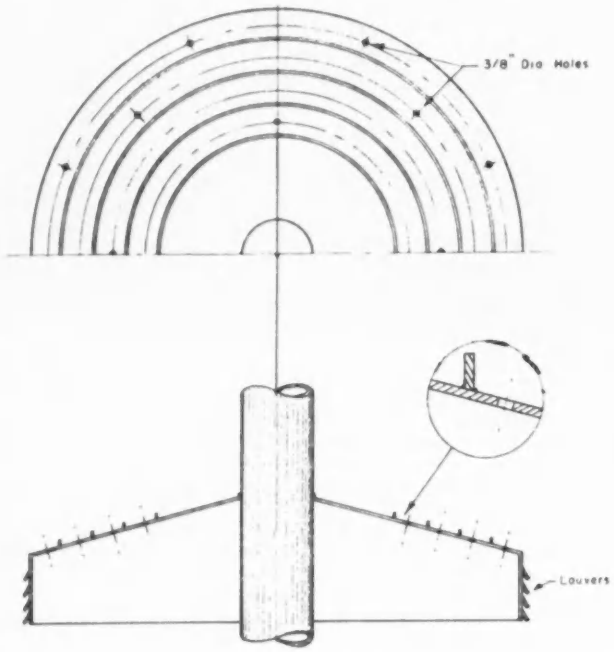

Fig. 5—Inverted cone spreader for pilot wash tank.

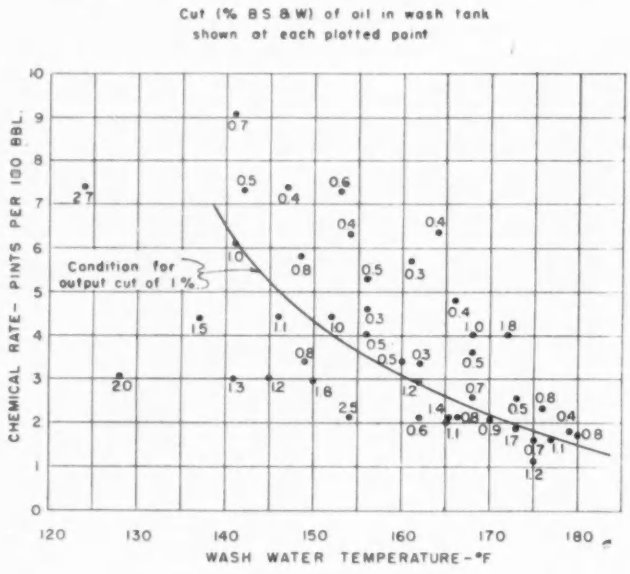
Cut (% B.S.&W.) of oil in wash tank shown at each plotted point
CHEMICAL RATE- PINTS PER 100 BBL.
Condition for output cut of 1%
WASH WATER TEMPERATURE - °F

Fig. 6—Wash water temperature vs. chemical rate. Gross throughput equals 115 barrels per day.

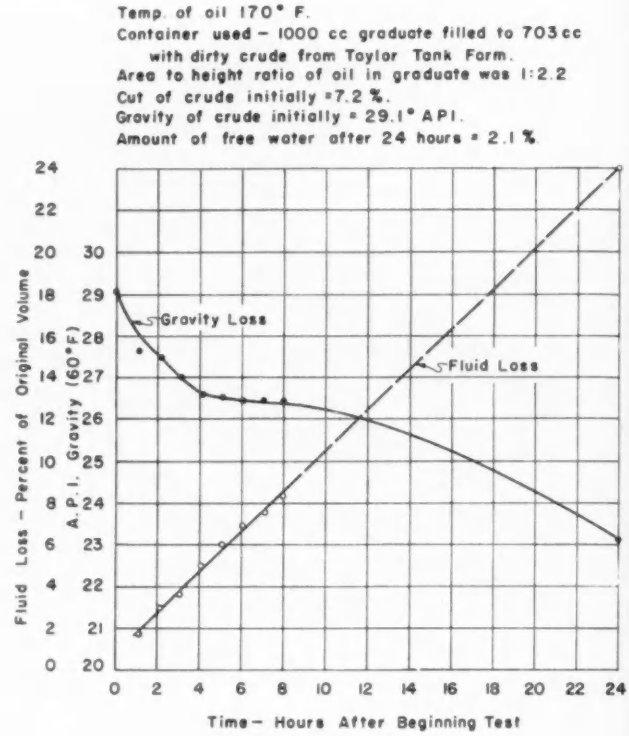
Temp. of oil 170° F.
Container used – 1000 cc graduate filled to 703 cc with dirty crude from Taylor Tank Farm.
Area to height ratio of oil in graduate was 1:2.2
Cut of crude initially =7.2 %.
Gravity of crude initially = 29.1° API.
Amount of free water after 24 hours = 2.1 %
Gravity Loss
Fluid Loss
Fluid Loss – Percent of Original Volume
A.P.I. Gravity (60°F)
Time – Hours After Beginning Test

Fig. 7—Evaporation loss test.

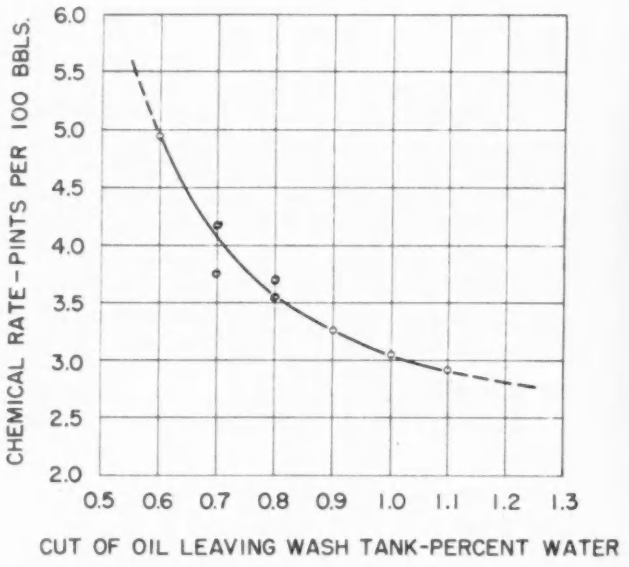

Fig. 8—Results of pilot plant dehydration tests; throughput 51 barrels per day; gross fluid water temperature 140° F.

terrain, are erected on the same grade as the wash tank.

To provide for gravity flow, the wash tank height is generally eight feet greater than the stock tank. If terrain is favorable, it is possible to avoid this unnecessary height. However, on level ground, the cost of building a firm sub-grade to elevate a low wash tank would normally exceed the cost of the extra height in the wash tank.

The recommended water level for the Ventura field is 12 to 15 feet on a 24 to 30-foot-high tank. This provides the adequate safety considering the slight, normal fluctuations in the water level.

This phase of the pilot plant test was confirmed by similar tests performed on a 750-barrel, 24-foot-high wash tank. Results obtained from the tests on the 24-foot tank were considered beneficial in evaluating the effect of water level because of the limited variation in water level obtainable in the eight-foot height of the pilot tank.

Water Leg. The simplest method of controlling the water level in a wash tank is by a water leg which operates on the difference in the specific gravities of the water and oil. This method is ineffective with low gravity production where the specific gravity of the oil approaches 1.0 unless the crude is heated to reduce its specific gravity. Differential pressure controlled valves have performed this function but these valves require more maintenance than the elevated pipe bleed.

Design of the water leg or bleed line may be varied, but results of the pilot test indicate that there are sig-

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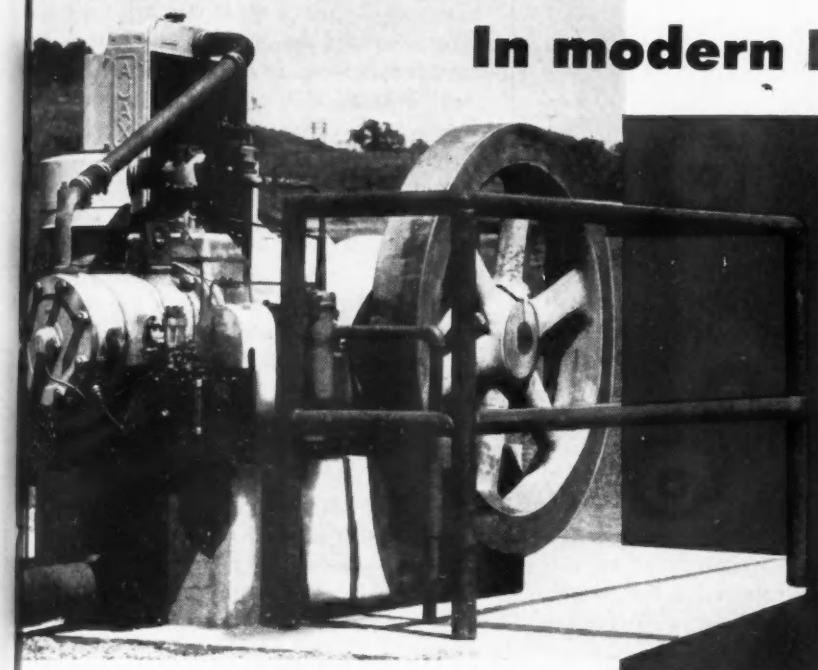

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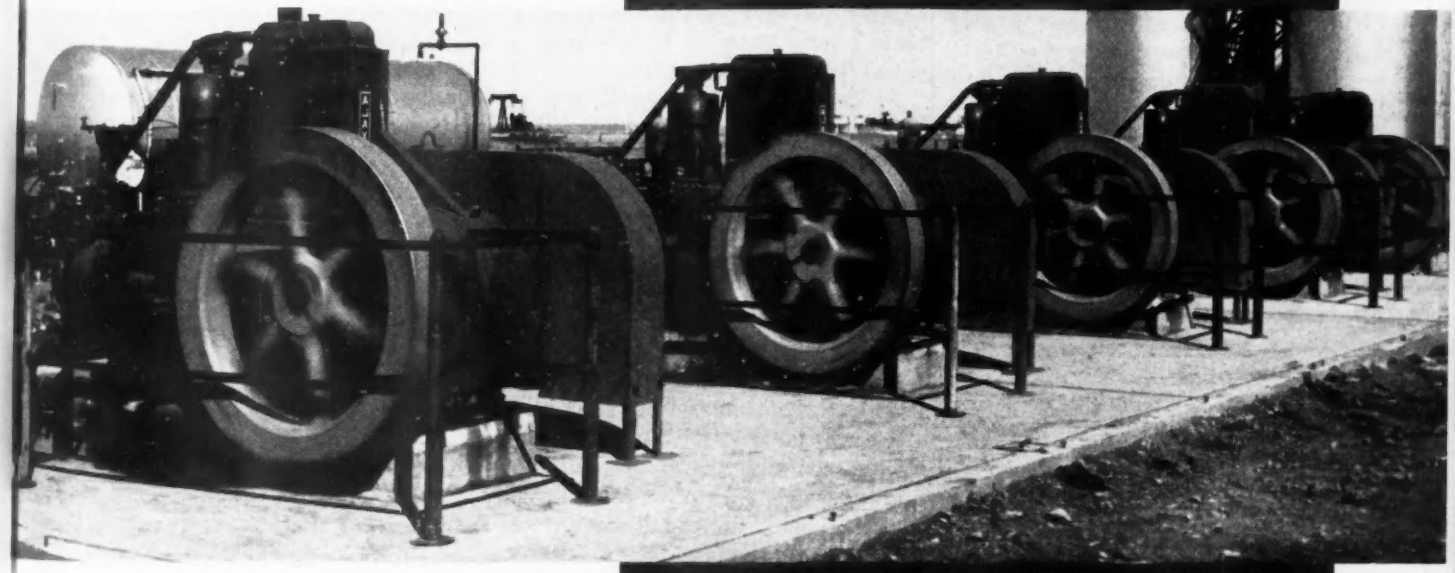

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nificant factors which can be incorporated in any design of an elevated pipe bleed. During the initial pilot tests, the bleed line from the tank to the control box was mounted externally and was uninsulated. Temperature changes caused a fluctuation in the density of the waste water in the line creating a thermo-syphon effect. This effect caused a change in the height of the oil-water interface to the extent that the depth of oil was varied 10 percent at 160° F. fluid temperature in the eight-foot pilot tank. To compensate for this condition, the bleed line should be installed internally or be insulated if the dehydration requires a hot process. Another factor to be considered is that the inlet end of the line should be located at least 24 inches, and preferably 36 inches, above the tank bottom to prevent plugging from sediment.

Collecting Tray. The pattern of flow in a wash tank is always inclined toward the oil outlet if thermal currents or gas are not excessive. In a 26-foot diameter or larger tank, or when throughput rates are in excess of 100 percent of the tank volume per 24 hours, the effectiveness of the tank is diminished if a single side outlet is used.

A collecting tray situated near the center of the tank is recommended. The tray can be supported around the center column with a serrated rim and the outlet line sloping to the outside wall of the tank. This line should always be sloped to prevent sediment deposition and vapor locking.

The serrated lip or rim on the pan compensates for slight sagging.

Value of Additional Settling Time. It was noted during the pilot plant tests that the chemical continued to function after the oil left the wash tank. Cut of the oil leaving the pilot wash tank was as much as 3 percent water at throughput rates of 200 barrels per day while the cut of the fluid in the stock tank was 0.1 percent after the tank had been filling for 24 hours. This condition presented the possibility of performing a portion of the dehydration process in the stock tanks, thereby increasing the wash tank throughput capacity.

Laboratory tests conducted on the effect of commingling the wash tank output with approximately an equal amount of cold, untreated oil as collected by the clean oil stream disproved this possibility. These conditions simulated practical operations whereby the clean oil is commingled with the dehydration plant output. The test included taking two samples at 147° F. from the output stream of the wash tank and allowing one sample to cool under normal air conditions, while the other sample was combined with an equal amount of untreated oil from the clean oil collecting line which was at a temperature of 70° F. and cut 1.1 percent water. The first sample continued to drop water for two hours while the cut of the second sample did not drop after the untreated oil was added and the temperature was reduced.

Over-all Results. The test conducted on the pilot plant included 128 sets of data taken under varying conditions. A prime object of the tests, in addition to the evaluation of equipment and operations mentioned above, was to determine the performance of wash tanks as compared to electrical dehydration. The cut of the electrical plant output oil stream was less than 1 percent water; therefore, the objective of the pilot plant was tentatively set at 1 percent output cut.

It should be pointed out here that a cut of 1 percent is an arbitrary figure selected for comparison. It may be advantageous in overall operations to deliver oil to the pipe line at some lower cut, although the California custom of 3 percent for pipe line acceptance does not encourage the producer to spend additional money to clean the oil beyond this acceptance figure.

Results of the first 19 sets of data determined the limits of the testing equipment but, since the tank was not insulated, control of the temperature was difficult. After insulating the tank, 19 more sets of samples were tested. Wash water temperature was controlled at approximately 165° F. and the throughput rate at approximately 180 barrels per day, or 300 percent of the tank volume.

Chemical addition rates were varied from 2.2 pints to 6.5 pints per 100 barrels of gross throughput. The cut of the oil at the outlet of the wash tank varied from a low of 1.0 percent to a high of 3.2 percent on these tests. Cost of operating a full-scale plant under these conditions would be uneconomical; therefore, it was decided to reduce the wet oil throughput rate to approximately 115 barrels per day.

The next 64 sets of samples were taken with an average wet oil throughput of 115 barrels per day, or approximately twice the rule of thumb capacity for this size tank. The wash water temperature was varied from 124° F. to 199° F. and the chemical addition rates were varied from one pint to nine pints per 100 barrels of gross throughput. From the results of the samples which were taken at 115 barrels per day throughput and temperatures of less than 180° F., a curve has been plotted (Figure 6) which indicates that a 1 percent cut can be obtained by either a combination of 170° F. of heat and 2.2 pints of chemical per 100 barrels, or 140° F. of heat and 6.5 pints of chemical per 100 barrels.

Observations made during these tests indicated that, with 30° API gravity crude oil, thermal currents and a boiling action occurred at temperatures above 170° F. which became so severe that the dehydration process was disrupted.

In an attempt to evaluate the loss

About the Author

A. R. (ART) WILLIAMS is a production engineer in Shell Oil Company's Coastal Division at Ventura, Calif. His engineering education at Oregon State College was interrupted for 35 months by military service in World War II during which time he saw duty in the South Pacific with the Army Combat Engineer Corps. Following the war, he returned to Oregon State College where he received a B.S. degree in mechanical engineering in 1947. He joined Shell Oil Company following graduation and after assignments in Long Beach and Bakersfield he was transferred to Ventura where his work was in connection with oil and gas production. He is currently handling special engineering projects for Shell's Coastal Division.

in volume and gravity at temperatures of 170° F. a laboratory test was conducted by allowing an uncovered graduate of the crude to stand for 24 hours at 170° F. Results are shown on Figure 7. There was a loss in gravity of 2.7° API after eight hours and a loss of 5.9° API after 24 hours at this temperature.

To overcome the vapor problem created by operation at 170° F., and also in an attempt to reduce the heating cost, the wet oil throughput rate was reduced to approximately 50 barrels per day and the temperature was reduced to 140° F.

It was estimated that the reduction in heating and chemical costs at these lower rates would partially offset the increased capital cost of the additional tankage which would be required to process the production at the decreased throughput rates. Another factor offsetting the tankage cost at the reduced temperature was the possibility of piping the wash tank output directly into the stock tanks without the use of heat exchangers. The elimination of heat exchangers would reduce the pressure drop of the system sufficiently to permit the adoption of gravity flow instead of pumping.

Results of varying chemical addition rate at the reduced heat and throughput rates is shown on Figure 8. As noted from this curve, an output cut of 1 percent was obtained on the 51-barrel-per-day throughput with 140° F. of heat and three pints of chemical per 100 barrels.

Based on these results, it was estimated that the oil could be chemically dehydrated for a cost comparable to the cost of the electrical dehydration process. However, the production tested in the pilot plant was predominantly the more difficult oil to treat while the cost for the electrical plant was based on treating a composite of production from all zones. (The pilot plant tests had been conducted on a portion of the stream which most nearly corresponded to the anticipated composite at the peak field production.)

A plan was formulated to construct a portion of the full-scale dehydration plant and to continue the tests on this portion of the plant.

End of Part I

ACKNOWLEDGMENT

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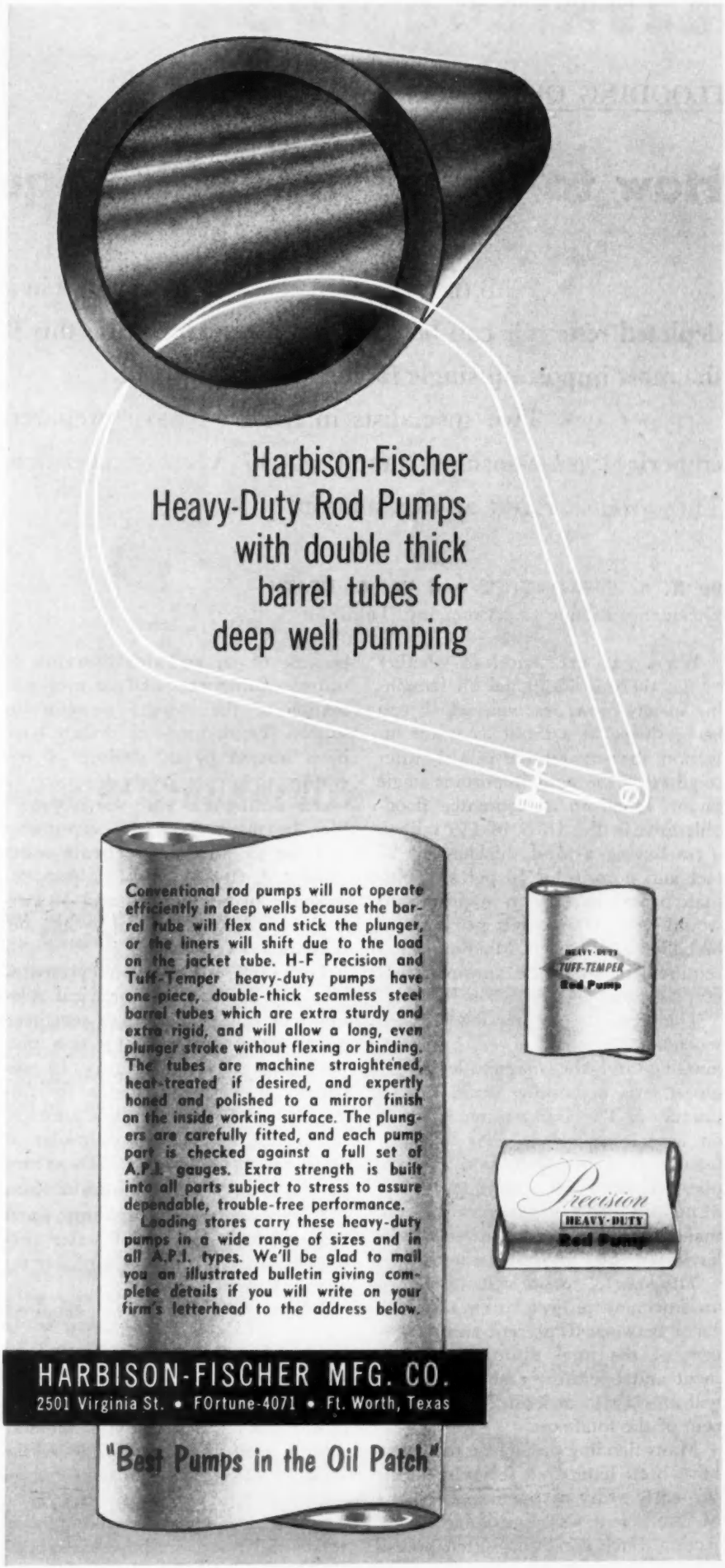
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How to Estimate Water Requirements

• With the exception of whether or not oil in a depleted reservoir can be recovered economically, this is the most important single factor in a water-flood.

• Two specialists in the field have prepared emperical relationships based on 17 years experience. They permit rapid approximation.

By R. C. EARLOUGHER and W. A. HEATH
Earlougher Engineering Company, Tulsa

WITH THE EXCEPTION of whether or not there is additional oil remaining in any given reservoir which can be produced at a profit by water injection, the amount and rate of water required is the most important single factor. Based on an estimated floodable area in the U. S. of 1½ million acres having a sand thickness of 25 feet and porosity of 18 percent, ultimate water injection requirements would be 55,000 barrels per acre, or 82 billion total barrels. Make-up water requirement would be approximately 60 percent or 49 billion barrels.

The amount of water required for secondary recovery of oil by water flooding and the magnitude of requirements in ensuing years can be estimated. The information is based on actual experience data accumulated over a 17-year period and applies to the water requirements for depleted sand reservoirs, pressure maintenance projects and reservoirs having gas caps and basal water sands.

The over-all cost of water alone for an injection project normally will range between 10 percent and 50 percent of the total ultimate development and operating cost and usually will amount to at least 20 to 30 percent of the total cost.

Many flooding projects in past years have been hampered severely during the early years of operation because of insufficient water available for injection. Such conditions often prevail because of an under-estimation of water requirements and an over-estimation of the source chosen for supply. Thousands of dollars have been wasted by the failure of operators to secure a good source of water during the early development life. In many cases the investment cost for securing an adequate water supply at the start of a project amounts to between 20 and 50 percent of the initial or first year's development expenditure.

Data and conclusions presented here are based upon empirical relationships obtained through seventeen years' experience with injection projects throughout the country. In estimating water requirements for any given project, there are three principal factors to be determined insofar as water supply is concerned. These are:

- Daily total water injection rate.
- Division between make-up water required and amount of water produced along with the oil available for re-injection.
- Ultimate make-up water required.

Basis of Estimating Requirements

RATE OF SUPPLY REQUIRED: The rate of supply needed can be estimated best on a sand volume method. A unit average injection rate for an injection program in a depleted or semi-depleted field of between 0.5 and 1.0 barrels per day per acre-foot of total sand reservoir should be anticipated. During the early stages or fill-up period of injection over-all economics of a project favor a higher rate of between one and two barrels per day per acre-foot.

The advantage of the higher rate during the initial stage is to obtain fill-up with a substantial increase in oil production in a period of 6 to 9 months. Although some operators favor a much lower rate during the fill-up period, field results indicate that the higher rates can be used without impairing ultimate oil recovery and at the same time greatly improving the over-all economics. Settled injection rates of one barrel per day per acre-foot can be maintained in many sand reservoirs occurring at depths below 1000 feet using surface injection pressures of 800 to 1000 pounds per square inch and in nearly all cases it is possible to maintain an injection rate of 0.7 to 0.8 barrel per day per acre-foot.

In most sandstone reservoirs in which the floodable oil pay section comprises only 25 to 50 percent of the total clean sand section with either a depleted oil sand section or gas sand occurring immediately above the oil pay and/or a thick water sand section immediately below the oil pay, field experience has indicated that injection rates should be planned taking into account the over-all sand section rather than the oil pay section alone. In other words, it has been found that most sand reservoirs have sufficient vertical permeability so that it is practically impossible to confine water injection solely to the oil pay section.

For example, assume a case wherein the total sand thickness is 75 feet with the top 15 feet being either gas sand or depleted oil sand section, the next 25 feet the oil pay section and the bottom 35 feet water sand, and in a field where there was no active natural water drive. In a case such as this, even though injection wells are completed so as to confine the point of entry of water within the 25 feet of oil pay, the injection rates should be based upon the total 75 feet of sand;

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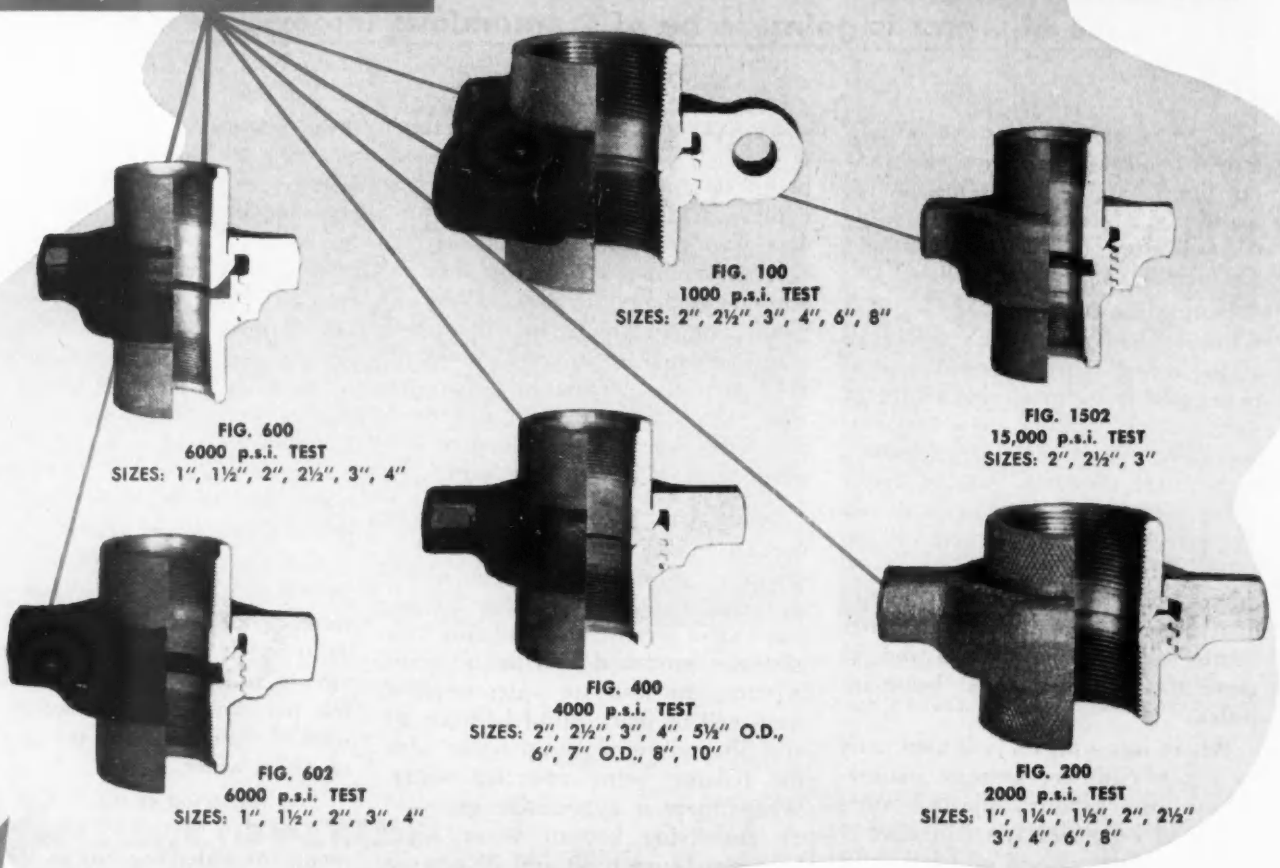

FIG. 100
1000 p.s.i. TEST
SIZES: 2", 2½", 3", 4", 6", 8"

FIG. 600
6000 p.s.i. TEST
SIZES: 1", 1½", 2", 2½", 3", 4"

FIG. 1502
15,000 p.s.i. TEST
SIZES: 2", 2½", 3"

FIG. 400
4000 p.s.i. TEST
SIZES: 2", 2½", 3", 4", 5½" O.D., 6", 7" O.D., 8", 10"

FIG. 602
6000 p.s.i. TEST
SIZES: 1", 1½", 2", 3", 4"

FIG. 200
2000 p.s.i. TEST
SIZES: 1", 1¼", 1½", 2", 2½" 3", 4", 6", 8"

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in other words, if a 10-acre flood pattern is being used injection rate during the fill-up period should be between 750 and 1500 barrels per day per well rather than between 250 and 500 barrels per day per well.

During the first 2 to 3 years of a water-flooding project practically all of the water used for injection must be secured from an outside source of water supply; that is, it is make-up water. At the end of approximately three years the total rate of water being injected will be between 50 and 75 percent make-up water with the balance being recycled water produced from the oil wells. At the end of a project make-up water requirements will vary between 25 and 55 percent of the total water being injected.

Where water injection is used early in a field's life for pressure maintenance operations, injection rates should be estimated at a minimum of twice the daily rate of oil production and preferably at a unit rate of between 0.5 and 1.0 barrels per day per acre-foot of oil sand reservoir.

Ultimate Water Requirements: Ultimate requirements may be estimated either on a basis of cumulative injected water-produced oil ratio, or on a pore volume method. The latter basis is believed to be the most reliable inasmuch as the ratio method presumes a rather accurate estimation of ultimate oil to be recovered. For example, case histories show a variation between 8 barrels of water injected to 1 barrel of oil produced at the economic limit of a water-flood to as high as 50 barrels of water injected to 1 barrel of oil produced.

Compared with this wide variation of ratios, case histories indicate that cumulative water requirements on the pore volume method range between 150 and 170 percent of total pore space. When the pore volume method is used, however, it is desirable to point out that for a water flood in a depleted field the pore volume of any overlying gas sand and underlying bottom water sand should be used in addition to the pore volume of the oil pay section. In a water injection-pressure maintenance program, however, ultimate water requirements may be used based on pore volume of the oil pay zone alone and exclusive of the water sand or free gas cap area.

Make-Up Water Versus Recycled Water: When flooding in a closed sandstone reservoir in which there is little or no gas sand or bottom water sand present, and assuming that all water produced with the oil is re-injected, the ultimate water requirement will be made up of between 40 and 50 percent make-up water with the balance being re-cycled water. Where there is appreciable gas sand or underlying bottom water sand, however, between 60 and 70 percent of water used will be make-up water with re-cycled water amounting to only 30 to 40 percent.

Possible Magnitude of Water Requirements for Water Flooding Stripper Well Areas.

From the above empirical data it should be possible to make a reasonable approximation of over-all water requirements in the ensuing years as water flood operations are expanded to additional stripper acreage throughout the United States. From the National Stripper Well Survey for 1949-1950, published by the Interstate Oil Compact Commission, it is reported that there were approximately 3 million productive acres in the stripper well class.

It is believed reasonable to assume that half of this, or 1,500,000 acres will be flooded within the next 20 years. Assuming an average sand thickness of 25 feet and an average porosity of 18 percent, the average cumulative water requirements will approximate 55,000 barrels per acre or 82-billion barrels of water. For this over-all spread of acreage it is believed probable that as much as 60 percent of total water required will be make-up water inasmuch as a large part of the acreage undoubtedly will be below average so far as flood performance is concerned. Thus, the estimated amount of make-up water required is 49-billion barrels.

Ten years hence it is believed probable that total injection rate for all water-floods throughout the U. S. will be as much as 25 million barrels per day, of which at least 10 million barrels per day will be make-up water with 15 million barrels per day being re-cycled water.

The following tabulation is an approximation of future water requirements for water flooding in the States of Kansas, Oklahoma, Texas and Illinois based upon acreage data contained in the 1949-1950 stripper well survey. The tabulation in Table 1 is presented here solely for the purpose of giving some idea of the magnitude of the amount of water which probably will be required for water flooding projects alone exclusive of water injection-pressure maintenance programs.

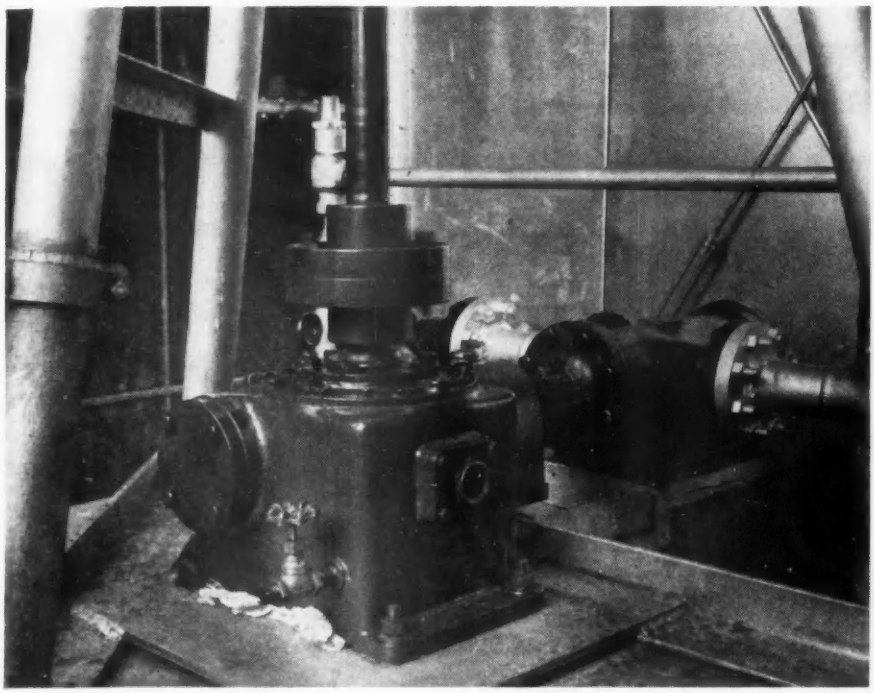
Source of Water: From this tabulation (Table 1) it is reasonable to conclude that the source of water for flooding is going to be of tremendous importance in many of the oil producing areas of the country within the next ten years. The magnitude of the requirements also indicates the necessity for developing adequate quantities of subsurface salt water for flooding because of the limited amount of surface water available in so many of the oil productive areas.

The Arbuckle limestone in Oklahoma and Kansas and its equivalent, the Ellenburger in Texas, constitutes an important source of supply water in the event shallower supply sands

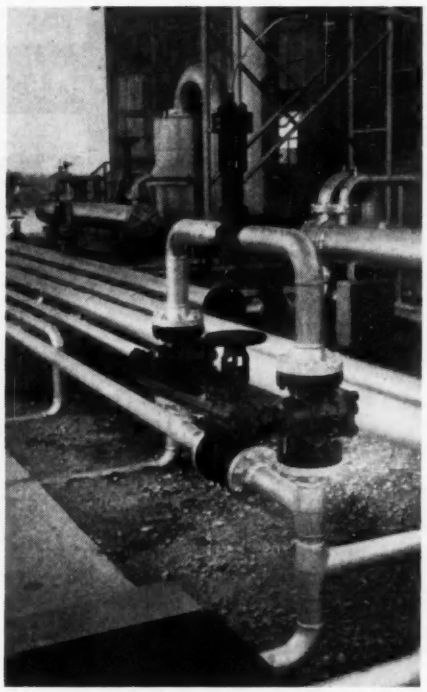
Continued on Page 222

TABLE 1

	Prod. Stripper Acres	Prob. Flood Acres	Ultimate Water Requirements Billions of Barrels			Max. Daily Requirements Million B/Day	
			Total	Make Up	Recycled	Total	Make Up
Kansas	288,000	100,000	5.5	3.3	2.2	1.7	1.1
Oklahoma	260,000	175,000	9.6	5.8	3.8	2.9	1.9
Texas	416,000	200,000	11.0	6.6	4.4	3.3	2.2
Illinois	223,000	150,000	8.2	4.9	3.3	2.5	1.6



COOLING FAN TOWER BASE, showing hydraulic motor in background and gear box in foreground.



TEMPERATURE CONTROL VALVE in hydraulic oil bypass system which governs engine jacket water temperature.

Hydraulic System Drives Cooling Fans

Economics is the mother of many unusual oil field hookups. Here's one that has proven its worth in almost two years of continuous service.

TWO HYDRAULIC pumps were hooked up in a unique installation to power cooling fans at a small gas injection compressor station and cool engine jacket water. The compressor plant supplies injection gas for a small pressure-maintenance project in southern Oklahoma. Two single-stage compressors handle approximately 20 million cubic feet of gas daily.

Basic plant design was governed by considerations of economy and safety, and further influenced by the absence, within reasonable distance, of both a plentiful water supply and a reliable source of electrical energy. Jacket water cooling for the two gas engine compressors was accomplished by circulation through two air fin coolers in a closed system arrangement which minimized water consumption.

Four-bladed fans in these coolers are customarily driven by electric motors since mechanical linkage to compressor engines or separate gas engines presents operational and assembly difficulties. Since compressor plant and other unit requirements were insufficient for economical generation of electric power at the plant, a hydraulic power system, utilizing engine lubrication oil as a medium, was incorporated into plant design.

Hookup. A flow diagram of the hydraulic power system, consisting of an integrated system for each of the two coolers, is shown in Figure 1. Major equipment components of each system include two positive displacement rotor pumps, one serving as a motor with inlet and outlet connections reversed, a gear box and a temperature-controlled motor valve.

The hydraulic pumps consist of three hardened steel rotors operating in a bronze inner housing and a semi-steel pump case. Operating principle is that of positive displacement by entrainment and propulsion of fluid between intermeshing threads of one power and two idler rotors. The pump is belt-driven from the compressor engine fly wheel by an idler and jack shaft assembly. Power requirements are 17.8 brake horsepower at 1795 revolutions per minute to deliver 108 gallons per minute at 260 pounds per square inch pressure.

The motor, an identical assembly, has 10.55 brake horsepower output at 1310 revolutions per minute, input of 108 gallons per minute at 260 pounds pressure. The worm gear speed reducer is rated at 10 horsepower at 1310 rpm input and has a 3⅝-to-1 reduction ratio. The worm and worm-shaft are nickel alloy steel, worm gears are bronze, and the housing is semi-steel. Gear shafts are mounted in tapered roller bearings with the lower bearing being splash-lubricated and the upper bearing lubricated by a piston-type pump. Motor and speed

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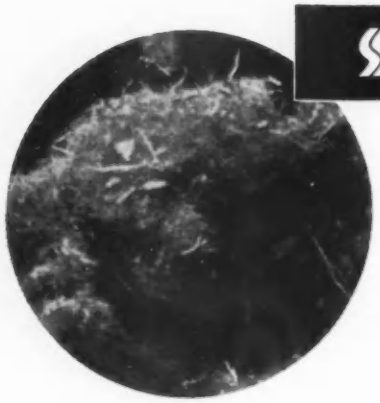

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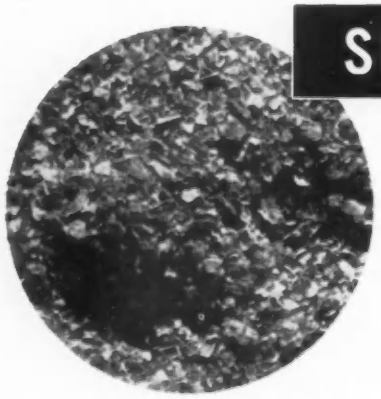
- Will not rot, deteriorate or sour in storage or in the hole.
- Is readily pumped through ordinary rotary drilling equipment and does not "rope" or "ball-up."
- Does not break down through circulation.
- Stays in suspension until deposited.
- Has no harmful effect on mud properties.



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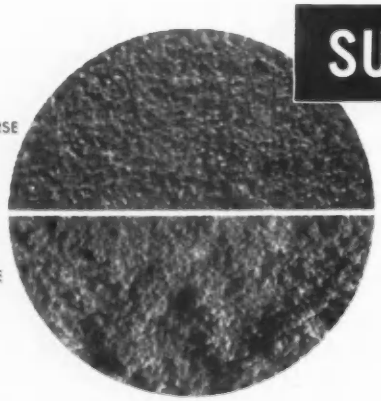
A complete bridging material alone, Silvaflake is also used in combination with conventional fibrous bridging agents. Silvaflake pours readily from easy-to-handle 50-lb. bags—Silvaflake will not deteriorate, sour or decay and has no adverse effect on mud properties.



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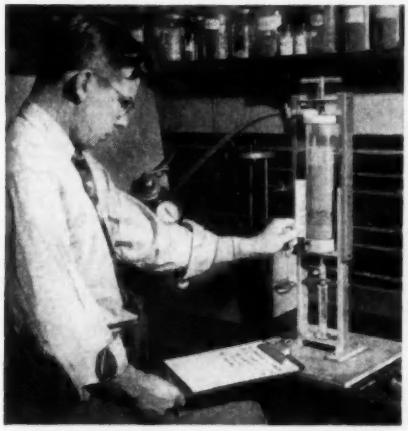

As ONE of the nation's largest producers in the forest industry, Weyerhaeuser has long engaged in research and development toward obtaining maximum values from their tree farms located in the great tree-growing areas of the Pacific Northwest. Cellulose and wood fiber products have always played an important part in the ever-changing oil well drilling industry. Thus it was logical that this Company some years ago assigned a team of skilled research engineers to work with members of the oil well drilling industry in developing products of exceptional effectiveness and economy for drillers. The resulting products proved themselves so successful in the field that specially engineered quality-controlled plants are now producing them in trainload volume. Supplies of both raw materials and finished products are available in dependable, unlimited quantities. Shown at left are Weyerhaeuser products engineered and tested to prevent and control lost circulation. Another range of products—*SILVACON and SILVATAN (developed from components of Douglas fir bark)—have proved effective drilling mud conditioners. Field engineering services are always available to users of Weyerhaeuser products.

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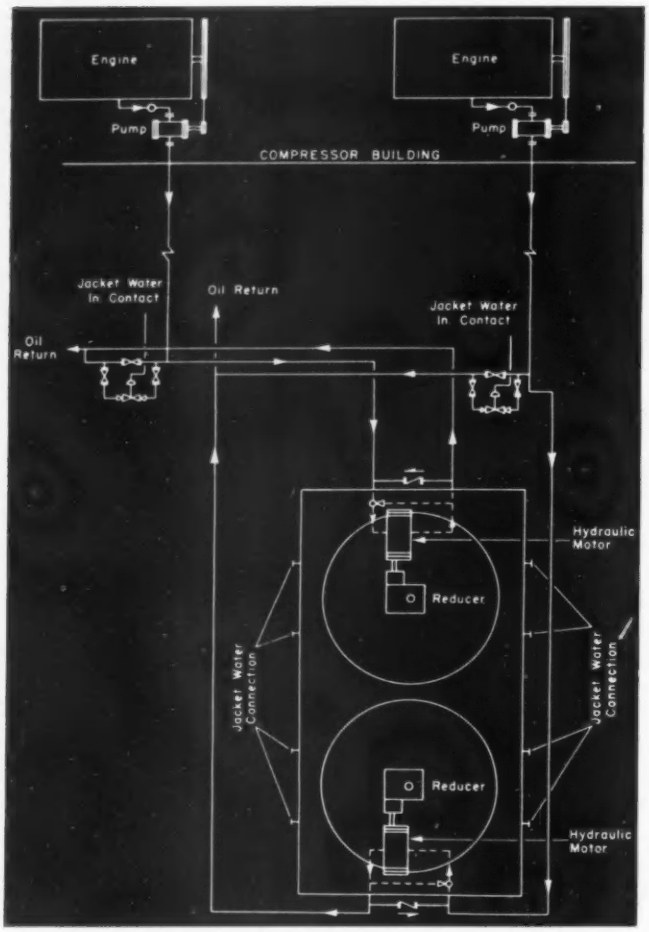

Fig. 1—Schematic layout of hydraulic power system which drives cooling fans.

reducer are connected by a flexible coupling.

How It Works. During a cycle of operation, lubricating oil is pumped from the engine crankcase, to drive the hydraulic motor. Oil is returned to the crankcase through the hydraulic oil return line. Power is transmitted from the motor to the right-angle speed reducer which drives the four-bladed fan of the air fin cooler.

Fan speed is varied by controlling the volume of power oil circulated through the hydraulic motor and is regulated automatically by the cooled jacket water temperature. The direct-acting, temperature-controlled motor valve bypasses power oil from the pump discharge line to the hydraulic oil line on being actuated by the temperature of jacket water in the inlet header to the engines. The valve has a temperature range of 100-160° F and is of conventional construction.

Safety Features. Equipment protection from excessive pressure is provided by a relief valve and bypass line which routes power oil around the motor in case of motor or gear box failure. Self-cleaning strainers are installed on pump and motor inlets to insure against excessive wear. Oil is maintained in the system by physical design to prevent drainage during shutdown periods. In order to avoid mechanical strain on the fan shaft and other parts of the fan drive when the main unit shuts down, or in the event of a pump failure, a bypass with a check valve is installed between the motor inlet and outlet lines (See schemmatic diagram). This hydraulic bypass allows dissipation of inertia from the rotating fans by permitting fluid circulation during the brief period of fan rotation following shutdown.

During 22 months of operation, the hydraulic system has recorded satisfactory service and no improper function of automatic controls has been experienced. Repairs to the pump and jack shaft assembly were required on several occasions during initial operation and were caused by improper alignment of the coupling connecting jack and pump shafts. Development of an alignment procedure has eliminated this difficulty.

—**The End**

Flooding Operations . . .

Continued From Page 216

are absent. Although the initial cost of developing water supply from the formation is high because of the depth, a prolific supply usually can be procured with only a small fluid level draw-down from a high hydrostatic level.

Locally blanket subsurface sands such as the Tar Springs in Illinois, the Douglas and Mississippian in Kansas and the Elgin in Oklahoma, are used for water supply. Gravel beds underlying valleys of the existing rivers which are fed by the rivers also are used extensively.

It is believed that adequate sources of water are present in subsurface water sands underlying the oil producing areas to provide the necessary water for flooding.

Conclusions. Average water injection requirements of between 0.5 and 1.0 barrel per day per acre-foot of sand should be anticipated. Acre-feet of sand should include gas sand and water sand if present above or below the oil pay sand in addition to the oil pay sand.

Case histories indicate ultimate water injection requirements between 150 and 170 percent of pore space. Ratio of cumulative water input to cumulative oil production for the same floods ranges from 8:1 to 50:1 and is a less reliable basis for estimating ultimate water requirements.

Assuming that all produced water is re-cycled, ultimate make-up water requirements should range from between 40 and 50 percent of the total input for reservoirs which are composed mainly of oil pay sand, to between 60 and 70 percent of total for reservoirs that have appreciable gas or water sand present.

Based on an estimated floodable area in the U. S. of 1,500,000 acres having a sand thickness of 25 feet and porosity of 18 percent, ultimate water injection requirements would be 55,000 barrels per acre or 82-billion total barrels. Make-up water requirement would be approximately 60 percent or 49 billion barrels. These estimates do not include water which will be required for water injection-pressure maintenance projects or for acreage not now included in the "stripper" class.

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Conditioning Engine Exhaust Gases for Repressuring

Trials have proved that it will work. Its availability and low solubility in oil make it useful. Here are results of field tests.

By DR. J. N. BRESTON
Pennsylvania Grade Crude Oil Association, Bradford, Penn.

ENGINE EXHAUST gases have been conditioned and compressed for injection into an oil reservoir to increase recovery. Conditioning of the gas was necessary to render it non-corrosive during compression and injection. Experience gained has indicated that if it is desirable, conditioning of engine exhaust gas for injection into oil reservoirs can be made practical and economical.

Engine exhaust gas is being tried for two reasons, the main one of which is based on the results of laboratory experiments[1] which indicate that the less soluble the gas the greater could be the effect on oil recovery. Compared on equal volumes injected it was shown that nitrogen, which is only sparingly soluble in crude oil and water, had a greater effect on oil recovery than the more soluble gases such as natural gas, propane, and carbon dioxide. Since engine exhaust gas is principally nitrogen, the field test was performed with it.

The second reason for using exhaust gas was to study the feasibility of utilizing it as a repressuring gas in the oil fields. In many gas drive secondary recovery areas, natural gas for repressuring is unavailable or its high price makes its use uneconomic. In search for a substitute, producers have turned to air as a driving medium. However, the use of air is not very desirable because of the emulsion, corrosion and explosion problems created by the high oxygen content. Since engine exhaust gas generally is in large supply at compressor stations, and since it can be produced with a fairly low oxygen content, it is a potential source of cheap repressuring gas. Engine exhaust gas is corrosive, however, and inexpensive methods of treatment to render it non-corrosive have to be developed before its use for repressuring can be made practical.

In this test, an experimental unit was built and operated to condition engine exhaust gas for injection into an operating water flood. The exhaust gas was obtained from a four-cylinder engine operating on dry natural gas. It analyzed approximately 88 percent nitrogen, 11 percent carbon dioxide, and less than 0.5 percent oxygen. Conditioning the gas consisted of

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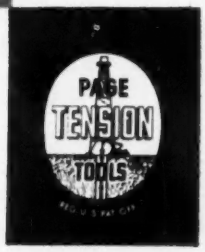

cooling, washing and then drying in towers filled with a bauxite desiccant. The drying was performed after partial compression to 27 pounds per square inch gauge and again at 1340 psig.

The experimental unit was operated 55 days during which time over 1 million cubic feet of engine exhaust gas were conditioned, compressed and injected into four wells of the flood. The experiment was terminated when the prescribed amount of gas was injected into the wells. The operating experience, backed up by corrosion test data, shows that engine exhaust gases can be conditioned for use in repressuring oil reservoirs.

An interesting aspect of this test was the fact that the exhaust gas was supplied entirely by the engine used to operate the compressor Tentative data show the cost of conditioning engine exhaust gases to be very low. Thus, such gases can be an economical source of repressuring gas.

Corrosion. Many of the early attempts at using engine exhaust gases for repressuring purposes were failures because of corrosion difficulties. Investigations disclosed that the principle cause of corrosion was nitric acid. During combustion nitric oxide (NO) is formed by the direct reaction of nitrogen and oxygen. The nitric oxide itself is odorless and only slightly corrosive when liquid water is present. When the products of combustion are cooled and compressed, however, the nitric oxide is oxidized by any oxygen present and nitrogen dioxide (NO_2) is formed. Nitrogen dioxide when dry is relatively non-corrosive, but when contacted with liquid water it forms nitric acid (HNO_3) which, of course, will corrode iron very rapidly.

There are three possible methods for preventing nitric acid corrosion in the compression and handling of exhaust gases:

1. Removal or neutralization of the nitrogen compounds in the exhaust gas.

2. Neutralization of the nitrogen compounds in the condensate traps during and after compression.

3. Drying the gas adequately before and after compression.

The removal or neutralization of NO and NO_2 gases by oxidation, catalytic conversion, or scrubbing with solutions is generally impractical or ineffective. The experience of others[2] indicated that the most feasible way of minimizing corrosion is to dry the gas.

Considering the high pressures to which the exhaust gas had to be compressed in this test (1350 psig), as well as the low dew point required for winter operation (less than 0° F. at 1350 psig), it became apparent that the gas would have to be dried to an extremely low water content. This was necessary not only to prevent moisture precipitation in the conditioning system, but also in the pipe conducting the gas to the injection wells and in the well tubing.

Considering the rapid change in saturated humidity with pressure (see Figure 2), if the drying could be done at some higher pressure, less drying tower capacity would be required. It can be safely assumed that the saturated humidity of the engine exhaust gas (approximately 89 percent nitrogen and 11 percent carbon dioxide) is not very different than that for air (79 percent nitrogen and 21 percent oxygen).

Since a three-stage compressor was available for the experiment, it was decided to dry the exhaust gas between the first and second stages at a pressure of approximately 30 psig. By drying at that pressure the drying tower capacity was reduced to one-third that necessary to dry the gas before compression.

Field Unit. A flow sheet of the pilot plant is diagramed in Figure 1. To facilitate description each major unit of apparatus is numbered.

The gas was obtained from a 20 horsepower engine (1) operating on dry natural gas. This same engine was used to operate the compressor and one blower. The exhaust gas was taken directly from the exhaust pipe and passed to a gas washer and cooler where water sprayed down over tile packing material as the gas passed up through it. To minimize corrosion, the washer was lined with a thick coating of heavy bitumastic paint.

The gas then passed through a trap (3) intended to precipitate any carryover of mist. It then was sucked through a blower (4) to prevent backpressure on the engine and also to create a positive pressure on the intake valve of the first stage of the compressor. The gas was passed through a standard felt filter (5) before entering the compressor (6).

The compressor used was a radial, three-stage, air-cooled unit with the regular intercooler system removed. Piping was made directly to the valve heads through special adaptors. From the first stage of the compressor, the gas passed through a water cooled condenser (7) consisting of a bank of 2-inch pipe. The bottom length of pipe was extended to a trap. The cooled gas still contained both water and oil mist which were removed by passing the gas through a mist breaker and filter (8). The oil mist, which came from the lubricating oil of the compressor, had to be removed from the gas to prevent its carry-over to the drying towers where it would "poison" the desiccant. The mist breaker was packed with coke and coarse glass wool. The drippings passed out the bottom to a drip collector.

The gas then passed into the top of one of the drying towers (9) and (10). Each tower contained approximately 180 pounds of a commercial bauxite which is capable of adsorbing up to 10 percent of its weight of water when new and at least 5 percent after repeated regeneration. It has good mechanical strength even when soaking wet and is not readily poisoned. Through the centers of the towers passed helical cooling coils. Cold water was passed through the cooling coils while the towers were drying. The heat of adsorption during drying is considerable and has to be removed to prevent the desiccant from heating up and decreasing its drying capacity. Two towers were used so that while one was in operation the other one could be regenerated. Regeneration was accomplished by passing hot air through the tower. The air for regeneration was blown with pressure blower (11) through the air heater (12) and into the tower. The air heater was a triple bank of two-inch pipe heated by gas burners underneath.

Upon leaving the drying tower the gas was passed through a dust filter (13) to prevent any possible carryover of bauxite dust or rust to the gas meter and compressor. Before entering the second stage of the compressor the gas passed through a meter (14) where it was measured under operating pressure. The gas was then compressed in the second stage (15) and passed through an air cooled heat exchanger (16). The heat

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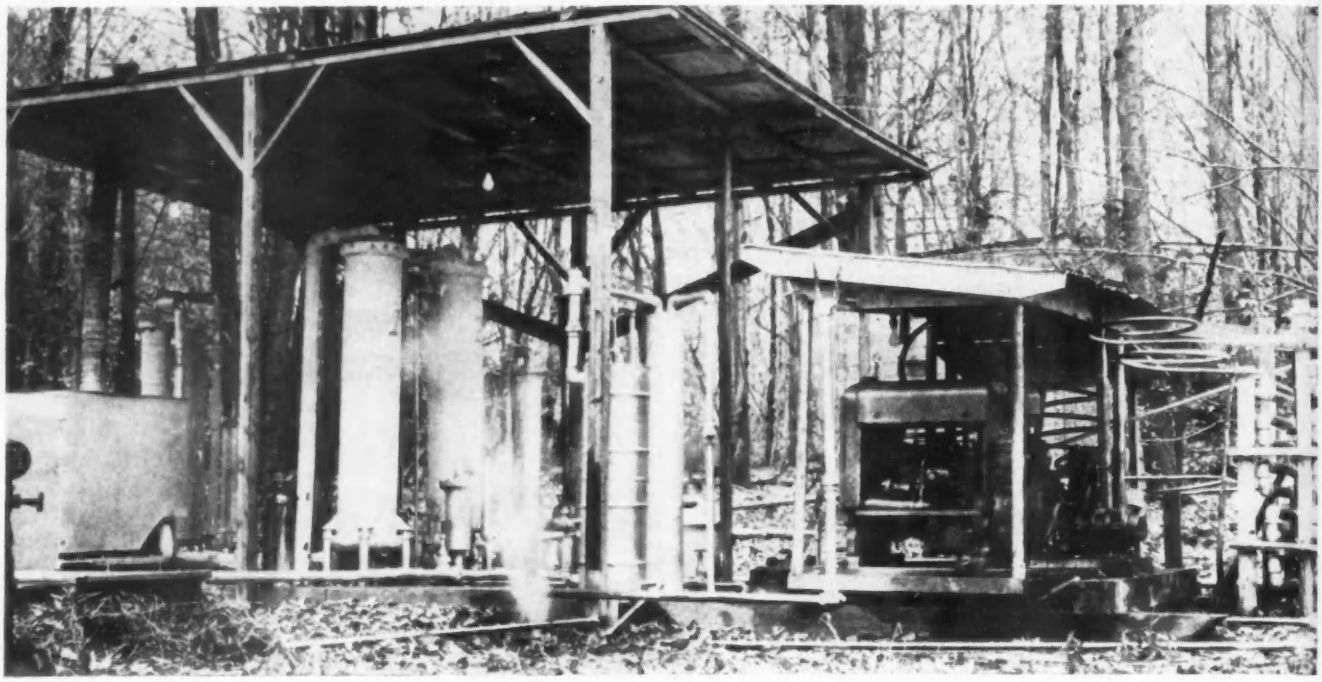
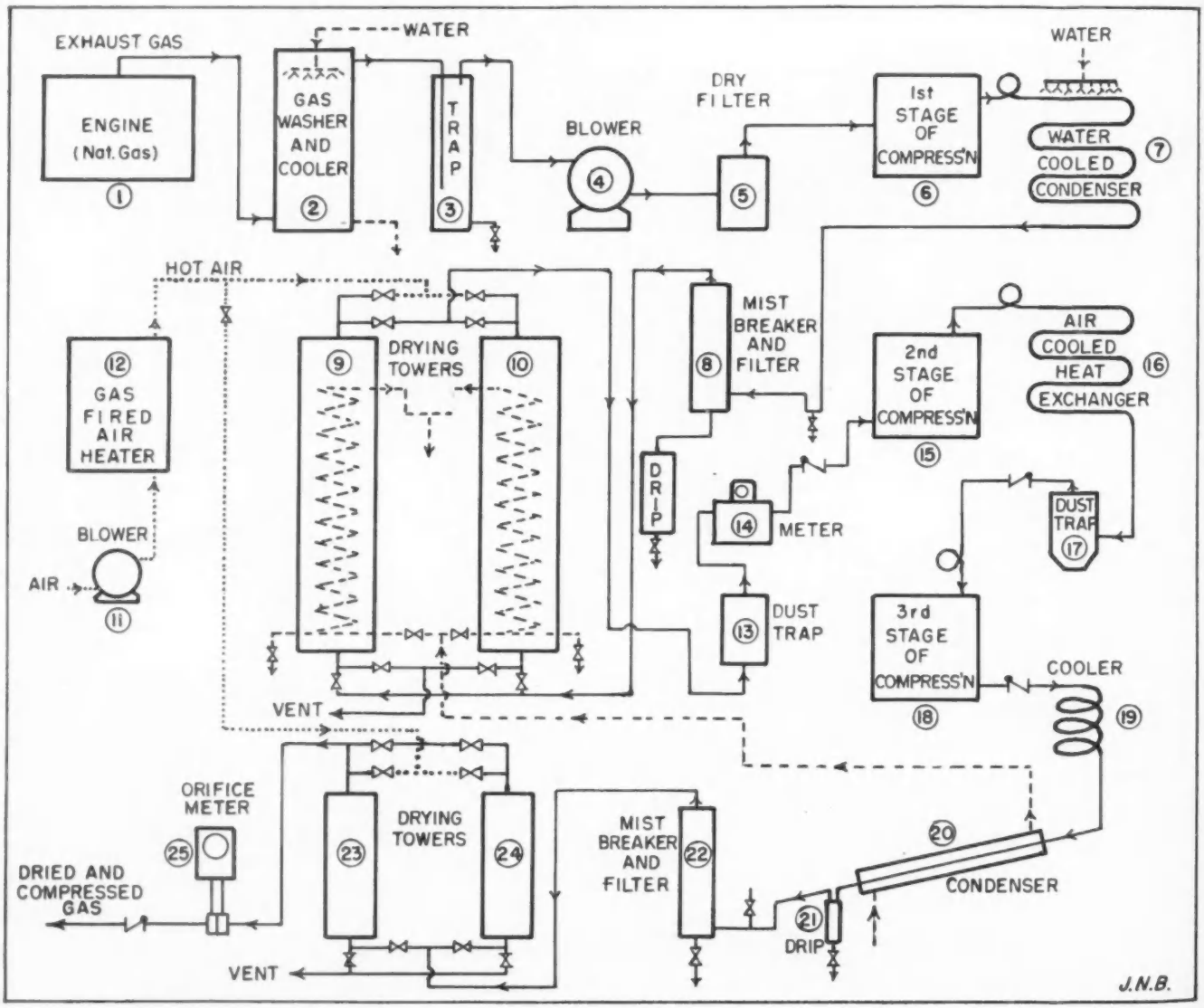


PILOT PLANT (above) used to condition engine exhaust gas for repressuring.

Fig. 1 (below)—Diagram of engine exhaust gas conditioning pilot plant.



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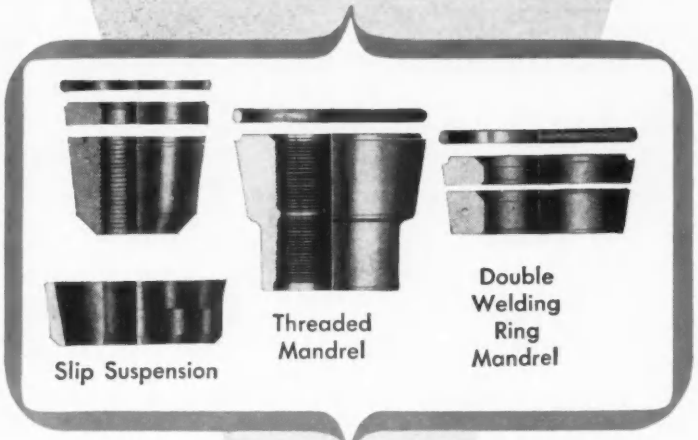

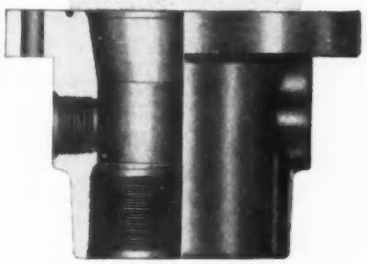

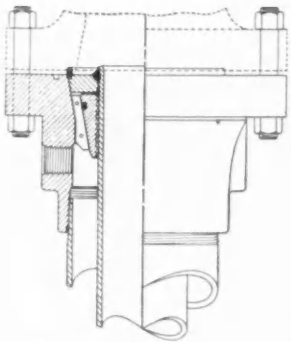

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exchanger was designed to cool the gas enough for the third stage of compression but not enough to cause precipitation of any moisture. Before entering the compressor again the gas passed through another dust trap (17), similar to (13).

The gas passed through the third stage of compression (18), was air cooled in a coil of heavy walled pipe (19), and then passed through a water cooled condenser (20). Any condensate which formed was caught in a trap (21). The inner tube of the condenser and the trap were constructed of 20 percent nickel steel which will resist corrosion by dilute or concentrated nitric acid. Normally only condensed lubricating oil mist was found in the trap. On several occasions when aqueous condensate did precipitate in the condenser, it was drawn from the trap as fairly strong nitric acid.

Since the gas still contained oil mist it had to be passed through another mist breaker and filter (22) before entering the final drying towers. All the equipment from the third stage and beyond was designed and tested for high-pressure operation.

The gas was given a final drying in one of two high-pressure drying towers (23) and (24) before being sent to the wells. An orifice meter (25) measured the total amount of gas going to the wells.

The unit was operated continuously day and night. Regeneration of one large and one small drying tower was performed daily. In the morning one of the lease workers would start the furnace and switch towers. The ones used for the previous 24 hours were put on regeneration, and the ones which were dried the day before were put on stream. In the afternoon, about 5 or 6 hours later, the worker would return to shut off the furnace, check the oil in the engine and compressor, and leave the unit for unattended operation until the next morning. When functioning properly the plant itself required approximately one man-hour of attention per day.

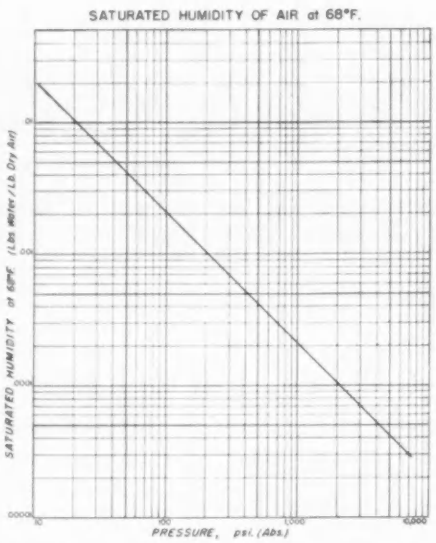


Fig. 2—Saturated humidity of air at 68° F.

As would be expected of any new pilot plant, a number of shut-downs were necessary to straighten out mechanical difficulties. Only one material failure on the drying unit was caused by corrosion. That occurred when the condensate overflowed the trap (21) and passed through the pipe leading to the bottom of the high-pressure mist breaker and filter (22). Being highly acid the condensate rapidly corroded the pipe and fittings until leaks developed in some of the threads. There was no significant corrosion in the compressor. Difficulties with the compressor were mostly mechanical.

Dehydration and Corrosion Control. At the start of operations and periodically thereafter dew point measurements were made with a Bureau of Mines dew point tester. The presence of hydrocarbon vapors made such measurements extremely difficult, but after some experience it was possible to distinguish the true dew point from the condensed hydrocarbon haze.

Gas samples were taken and analyzed in an orast apparatus for CO_2, O_2, CO, combustibles and N_2 (inerts). Acid gases were determined separately. Typical analyses of the gas at various locations in the plant are listed in Table 1.

Nine-tenths of the water in the exhaust gas leaving the engine was condensed out in the first washer-cooler. Two-thirds of the remaining water was eliminated upon compression to 27 psig and cooling. After passing through the high-pressure drying tower, the gas contained less than 50 parts per million of water and had a dew point of less than 0° F. at a pressure of 1340 psig.

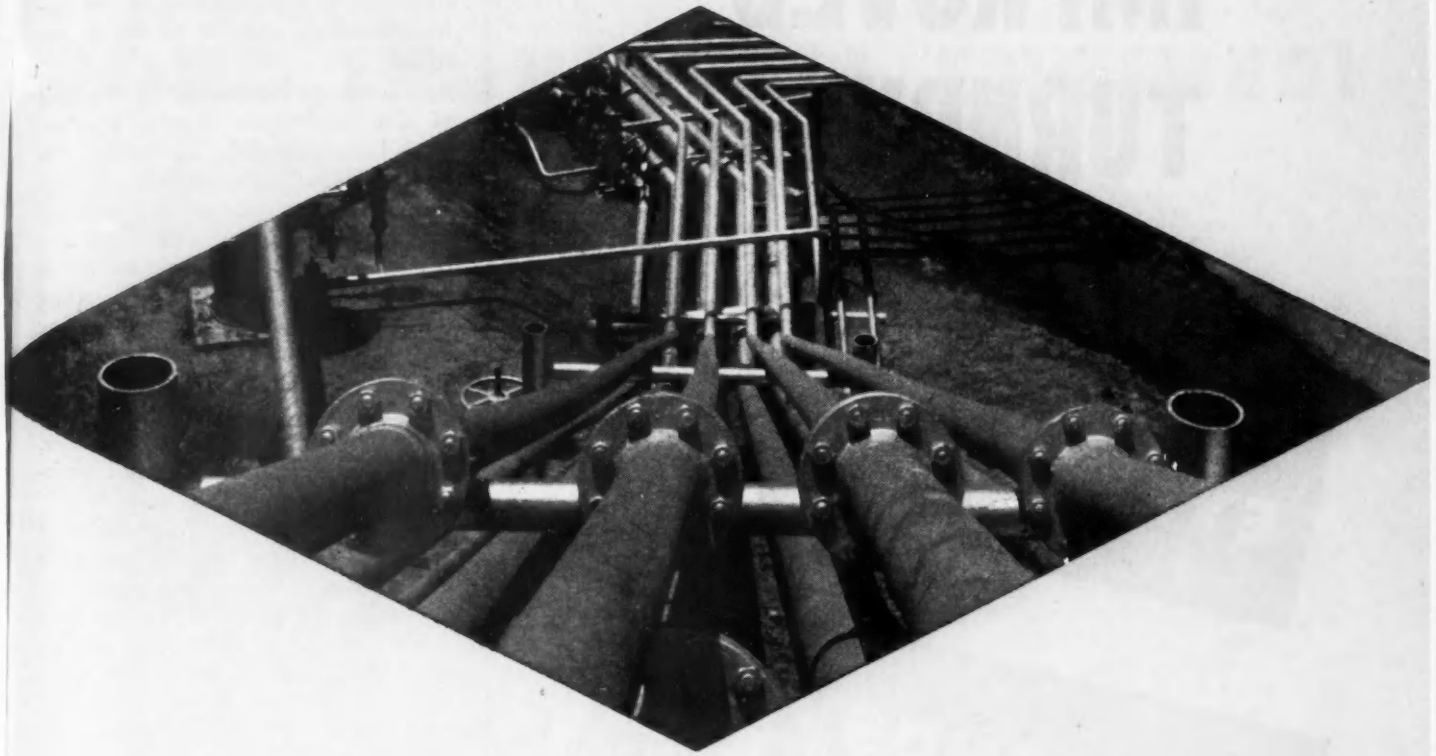
It is interesting to note that the content of so called "acid gases" increased each time the gas was compressed, and then was decreased each time the gas was passed through the drying towers. When the gas passed through the driers a considerable amount of the acid gases was adsorbed by the desiccant. Actually the high-pressure drying towers adsorbed much more acid gases than water.

Since corrosion was expected to be the most important factor in determining the feasibility of conditioning engine exhaust gases, particular attention was paid to the corrosiveness of the gas and its effect on the various parts of the equipment. Corrosion coupons were placed in strategic locations, and inspections of the equipment were made during several shut-downs.

The only corrosion of any consequence was in the lines leading from the condensers to the mist filters. The mist filters and traps appeared to have been protected by a coating of oil. There was no apparent corrosion in the drying towers or any of the lines to and from the towers. Most significantly, the corrosion coupons in the line leaving the high-pressure drying towers showed no visible signs of corrosion. This means that the exhaust gas leaving the conditioning plant was non-corrosive and would remain so as long as it

TABLE 1
Analyses of Engine Exhaust Gas at Various Locations in the Conditioning Unit

LOCATION and DESCRIPTION	Engine Exhaust Manifold	After Cold Water Washer and Trap	Before Low Pressure Drier	After Low Pressure Drier	Before High Pressure Drier	After High Pressure Drier
Acid Gases (NO, NO_2 and organic)	0.25	....	0.43	0.12	0.32	0.09
CO_2	11.05	....	11.27	11.68	11.0	11.11
O_2	0.4	....	0.4	0.75	0.2	0.5
CO	0.1	....	0.4	0.3	0.4	0.1
Combustibles	0.4	....	0.2	0.1	0.1	<0.1
N_2	87.8	....	87.3	87.05	87.98	88.1
	100.0%	....	100.0%	100.0%	100.0%	100.0%
Water content in lbs. per lb of dry gas (approx.)	0.140	0.013	0.005	0.0001	<0.0001	<0.00005
Dry bulb temp., °F	....	65	65	72	68	70
Dew point, °F	....	65	65	<0	<55	<0
Pressure, psig	0.1	0	27	26.5	1340	1340



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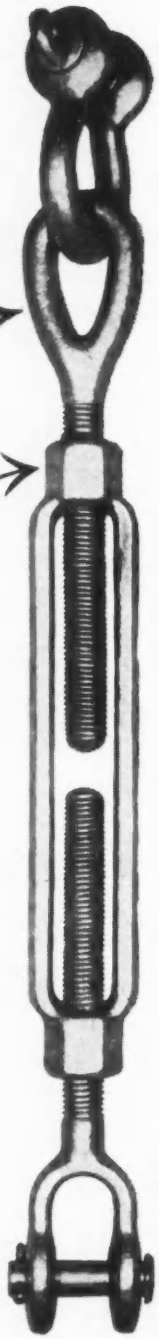

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was kept dry. After all, the main reason for conditioning the gas was to render it non-corrosive to the distribution lines and the tubing in the wells.

Applications Promising. On a basis of this experience it can be concluded that conditioning engine exhaust gas for injection into oil reservoirs can be made a practical thing. Where engine exhaust gas can be used, there is little doubt about the economic advantage of getting the gas just for the cost of drying it. In the unit just described, the energy released on combustion was used to compress the conditioned gas. From the cost of gas and water, investment in equipment, and probable depreciation, it can be estimated that the cost of conditioning engine exhaust gas by a method such as the one just described would be approximately 12 cents per thousand cubic feet. In a plant conditioning a million cubic feet per day or more it is not improbable that the cost could be reduced to about 6 cents per thousand cubic feet.

Caution should be exercised against the indiscriminate injection of engine exhaust gas into oil reservoirs. Reservoir conditions may be such that it would be undesirable to inject combustion gases even if they were conditioned. Furthermore, if it appears desirable to mix engine exhaust gas with natural gas, it will also be necessary to dry the natural gas or inject each gas in separate wells. If due consideration is given to such factors, the conditioning of engine exhaust gases for injection into oil reservoirs could be both practical and economic.

After injection of the exhaust gas, water was turned back into the wells. The water intake rates were equal to a better than those previous to gas injection indicating that the exhaust gas had no deleterious effect on the wells. The effect on oil production is still being studied.

ACKNOWLEDGMENT

These experiments were performed on a cooperative basis by the Thornton Company of Wellsville, New York, and the Pennsylvania Grade Crude Oil Association's Production Research Laboratory at Bradford, Pennsylvania. The author wishes to thank Knight Thornton of the Thornton Company and the Association's Production Research Technical Advisory Committee for permission to publish the results of these tests.

REFERENCES

[1] Macfarlane, R. M., and Saxon, Joseph, Jr., "The Effect on Recovery of the Solubility of a Gas Injected Prior to Water Flooding," *Producers Monthly*, Vol. 16, No. 1, p. 31-6, November (1951).

[2] Mehlhorn, Fr., "Forcing Flue Gas Into Petroleum Deposits," *Erdol Und Kohle*, No. 1, p. 70-3 (1948).

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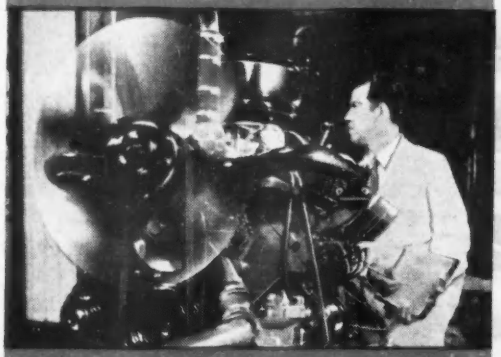

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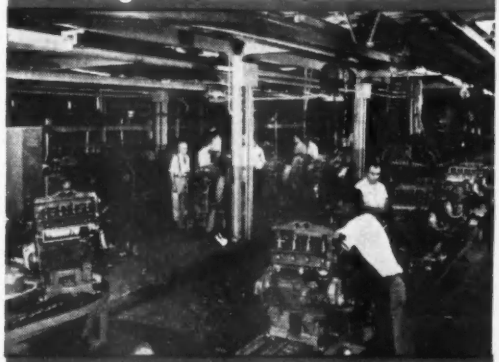

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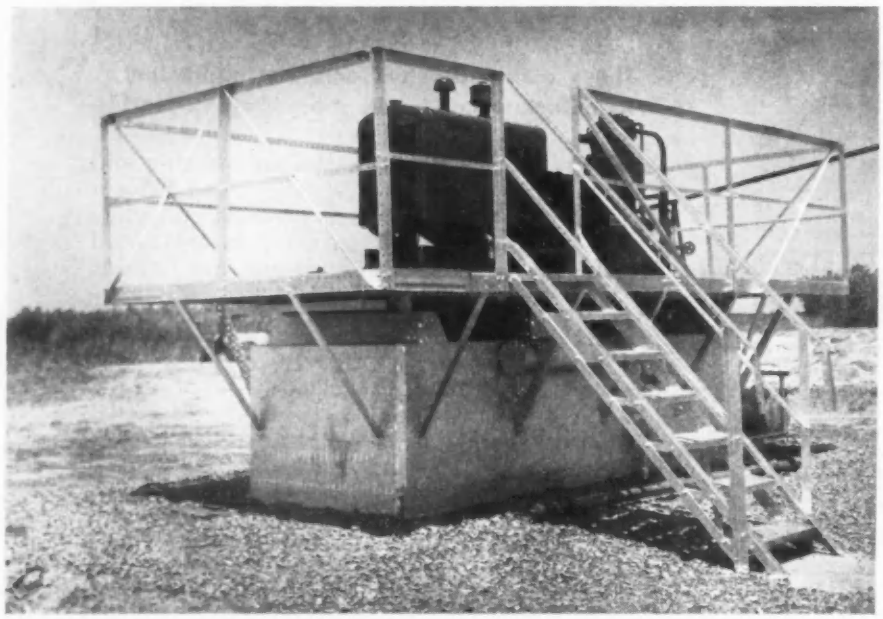


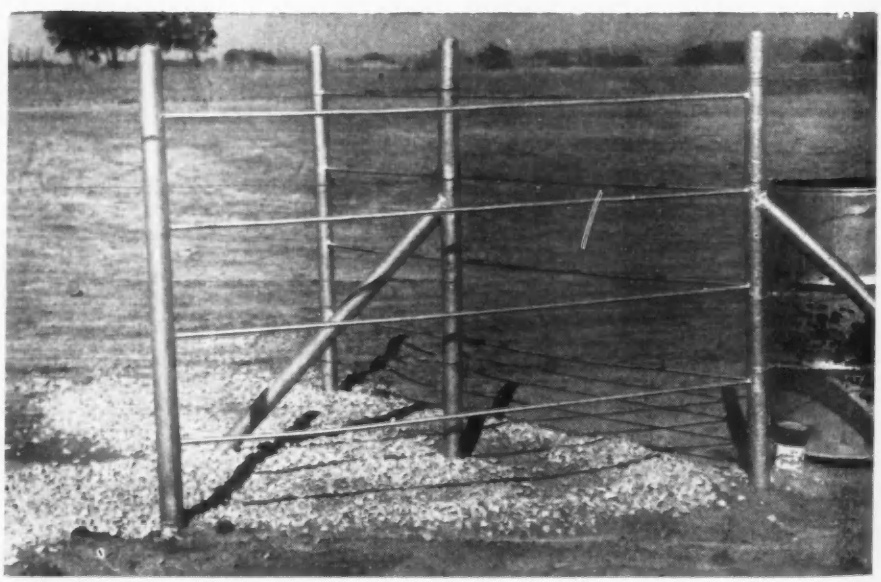
Elevating Hydraulic Power Oil Unit

In elevating the power oil unit for a hydraulic pumping system, advantage can be taken of the structure to conveniently mount accessory equipment. This well was located in a river bottom subject to flooding occasionally. The pump and engine that supplied the power oil to operate the hydraulic down-the-hole pump in the well was placed near an existing tank battery already erected to handle production from this well. At the tank battery, one tank was constructed to hold the clean power oil circulated by this pump.

To insure that the pump and engine unit would not be flooded during the high-water season, a concrete elevated foundation was erected about three feet above ground. The top was formed so that four concrete beams carried the weight of the engine-pump skid making it considerably easier to hook up the pump and engine connections from below the skid. This type installation eliminated unsightly lines and fittings that would normally be placed above the platform surrounding the unit. Made of foot plate steel, this platform was supported by angle brackets fastened to bolts grouted in the side of the concrete structure. These braces supported the gas scrubber, which is shown directly beneath the stairway leading up to the surrounding platform. The concrete foundation will withstand considerable currents should the water rise around it, and provides a sturdy foundation for the engine and pump unit to minimize vibrations.

Keeping Cattle Away

Many designs of gates will permit personnel to enter the enclosure surrounding a well, but at the same time prevent cattle from getting close to the location. Here is another gate that has considerable merit for its simplicity in construction and utility.



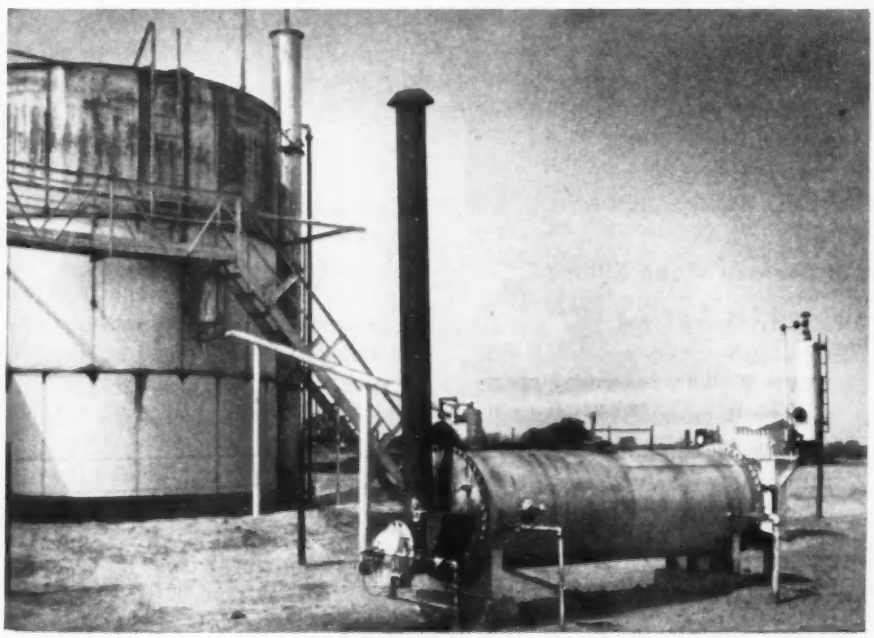
This gate allows people to come and go, yet keeps out stock and incorporates no moving parts in the gate. The gate consists of a vee-shaped fence that almost encloses the opening between two gate posts. The enclosure ends at one post that is braced and anchored in concrete. The other fence post is similar, except it forms the middle leg of the triangle arrangement of posts that support horizontal sucker rod pieces. These rods are welded to the vertical posts at intervals of about 14 inches. The distance between the midpoint of the rod fence and the end post in the middle is too narrow for cattle or horses to pass but large enough to permit a man to enter. In an area where cattle graze day and night, no trouble has been experienced with horses or cows entering the well enclosure. If the well is to be serviced, the barbed wire on one side of the enclosure is removed to allow the workover rig or pulling unit to be located adjacent to the wellhead.

Preventing Choke From Freezing

To test a gas condensate well before the tank battery and separator is erected and a heater installed ahead of the choke, a simple expedient to substitute for this hookup is to move the choke from the christmas tree out to the end of the bleed line. The choke connection itself is allowed to remain on the tree, but another choke bean, equipped with a hammer union is installed on the end of the line at the edge of the burning pit. The nipple in which the choke is installed is short enough so that the choke protrudes outside the nipple and there is no pipe ahead of the choke to freeze up and clog with ice.

In order to keep the blast of gas ignited, sometimes it is necessary to place some wood scraps in front of the flame so that they will burn during times that the well is making a head of drilling mud, and reignite the flame when the gas breaks through again.

When it is necessary to change the choke to get the tubing pressure on various rates of flow, the quick-acting union is broken, the choke bean raised up and the choke nipple changed as shown in the photographs.



Treating With Thermosyphon Heater

Treat small amounts of emulsified oil in a 1000-barrel tank with a thermosyphon heater placed a safe distance from the tank. This battery serves a one-well field where only a small amount of treating is needed.

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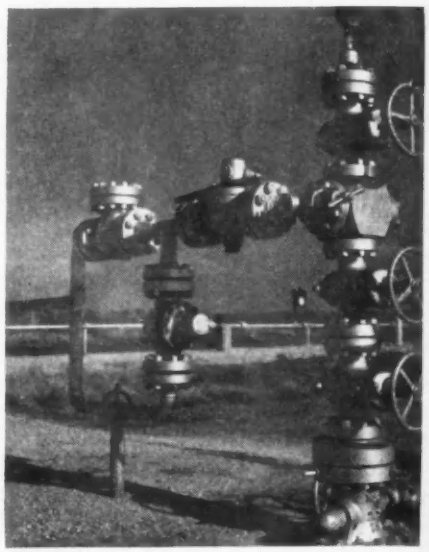
Since a salvaged indirect heater was available, it was placed into service to provide the heat needed to treat the oil and break the emulsion.

Because of the capacity of this tank, it serves as a gunbarrel and settling tank. A hot-water inlet line is connected into the tank below the water-oil contact. This four-inch line is supported at a slope down to the indirect heater shown. Cold water comes into the heater from a connection at the bottom of the tank, and this line was buried under ground. As the hot water rises to the top and into the tank, cold water is drawn into the heater from the tank bottom. In this manner, the tank is maintained at about 130 to 140 degrees Fahrenheit, which is sufficient heat to treat the emulsion and maintain a clear oil which overflows into stock tanks adjacent to this treating tank.

Chemicals can be added through a hopper placed in the hot water line of the thermosyphon system pictured beneath the tank walkway. Since production into the well is only about 100 barrels of fluid per day, the system puts out ample heat into the tank contents for satisfactory treatment. Gas for the heater is supplied from the lease separator.



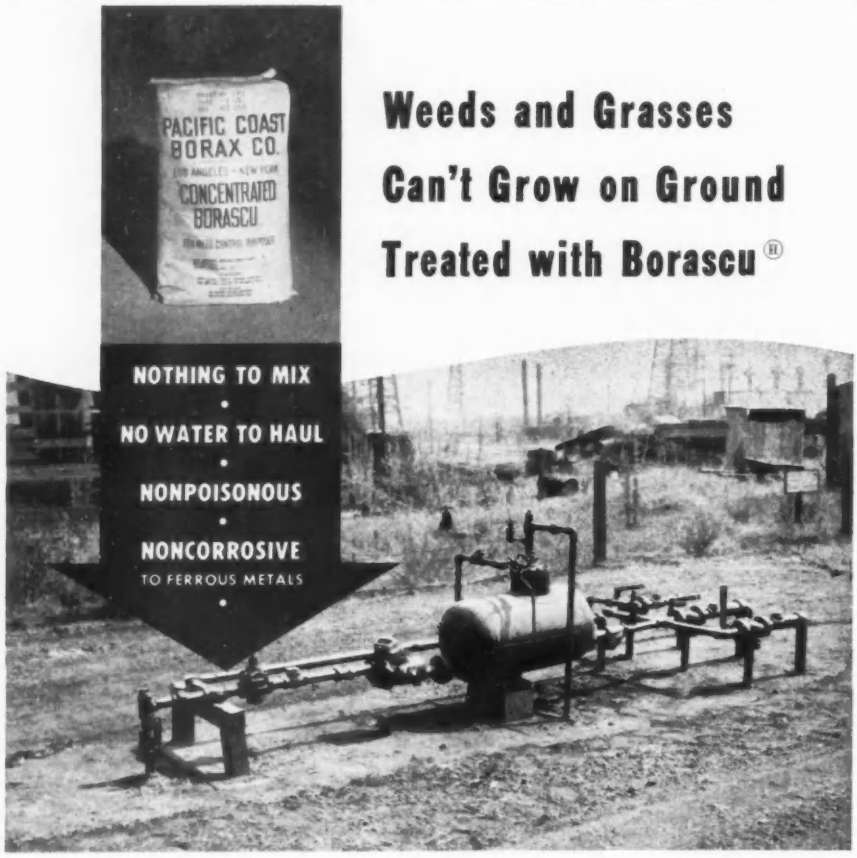
Back-Flowing Gas Well

Install a bypass line around the safety check valve in the gas supply line to an injection well to permit the well to be tested periodically by back-flowing it into the gas system. This makes it possible to determine if the formation is being stopped up or to test the progress of injection by allowing the well to back-flow as a producing well.

Since it is normal practice to equip the line bringing gas to the well with a check valve located near the well head, a bypass must be installed to provide for back-flowing. This check valve permits the leakage of gas back into the injection line when the compressor station is not supplying gas. Should the line be opened accidentally down the line, or shut in for repairs, replacing meters, etc., gas pressure will not be placed on the line from the formation receiving the gas.

The bypass system is shown at the left of the christmas tree. The gas supply line, elevated off the ground, is at the extreme left. During injection, the flow of gas is upward, through the check valve, through the plug valve and into the wellhead.

Should the operator desire to back-flow the well for any reason, the plug valve near the christmas tree is left



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open, and the plug valve installed vertically in the bypass line is opened. Flow of gas from the well is around the check valve. A short pipe supports the injection line and bypass system.

Cleaning Orifice Plates

To keep meter runs clean, weld a connection on top and bottom and on both sides of the orifice in bad cases of contaminated gas. In field meters handling wet gas, keeping the meter runs clean is difficult because the wet gas picks up foreign material from the vent lines and field lines and piles it in front of the orifice plate.

This cuts down the diameter of the line on the upstream side of the plate and causes faulty measurement. Sometimes the foreign matter piles up to the point where it partially clogs the orifice and gives much too great a differential on the meter.

The connections on the bottom of the meter run carry a valve which can be opened periodically and the dirt and rust blown out.

When foreign material will not flow out through the lower connection, the meter can be taken out of service, the lower valve opened, and the plug unscrewed on the top connection. Insert a piece of welding rod in the top connection and punch out of the lower connection any clogged material. The pressure will be restored to the line and the meter run blown out completely.

Cleaning Lease Fuel Gas

When a drip is necessary to keep liquids out of the gas lines before going into a heater or for other lease use, a tall riser before the gas gets to the regulator provides clean, dry gas to the burners.

Screw a tee on the line where the drip is located and "bull head" it with one side looking down and the other up. To the lower side, connect a joint of two-inch pipe, or larger if necessary, with a valve on the outer end to serve as a drip.

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The author is a member of the A.I.M.E. and the A.P.I. and has had over fifteen years of experience in acidizing oil and gas wells. He is at present chief petroleum engineer for the Chemical Process Company.

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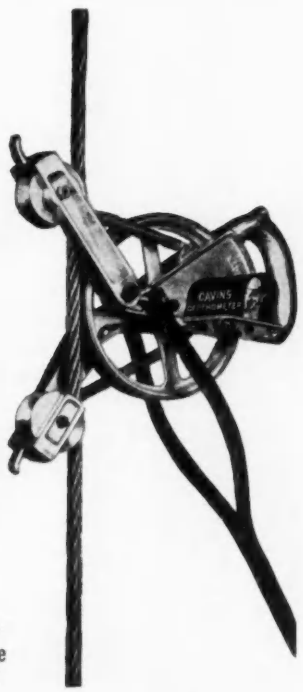

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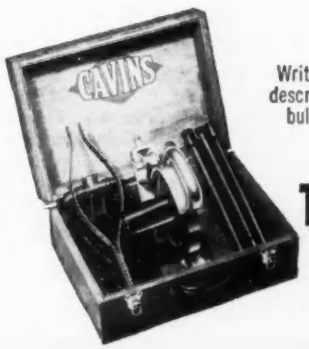

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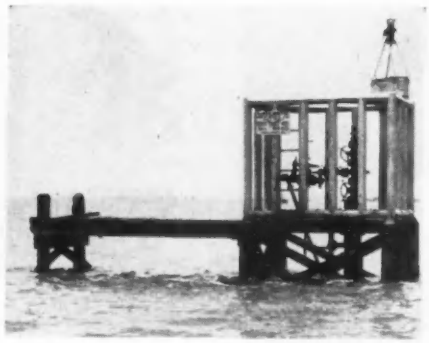
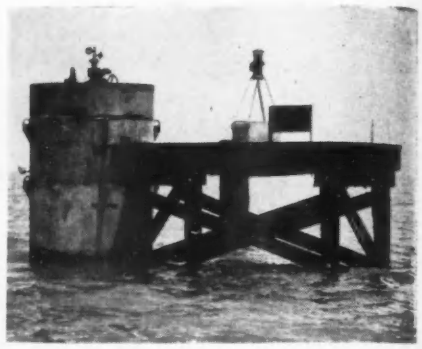
out of the tee, clamp a joint of pipe about 20 feet long vertically to a stake driven into the ground. This arrangement causes the gas to travel in an upward direction and allows the heavy fractions to drip out to the bottom.

Make the line leading back to the ground of one inch and install the regulator at a convenient height. By drying the gas before the pressure is reduced, the gas will release more of the entrained fluids, and hydrates will be prevented from forming in the regulator during the winter months.

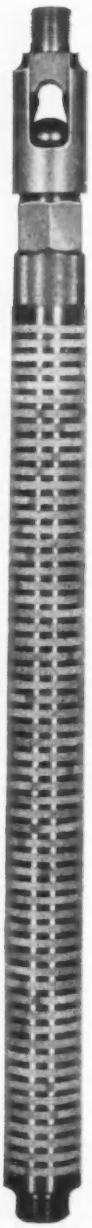




Protecting Christmas Trees

Protect christmas trees from shipping by either of two devices commonly used in bays along the Gulf Coast.

The method shown at left consists of pipe cut to similar length and welded to form a cage. Operators preferring the method shown at right—drive a length of caisson several feet into the bay's sands at the same time the adjoining platform is being constructed.



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Cleaning Hand Tools

A small electric motor attached to the fuel pump of an auto pumps sufficient gasoline or solvent to clean small tools handily. It is mounted in a small steel box and has a switch conveniently mounted on the side to turn the motor on and off. A plastic hose is connected to the discharge of the pump which will reach nearby objects. A nozzle on the end has a thumb-operated valve for adjusting the flow to the object being cleaned.

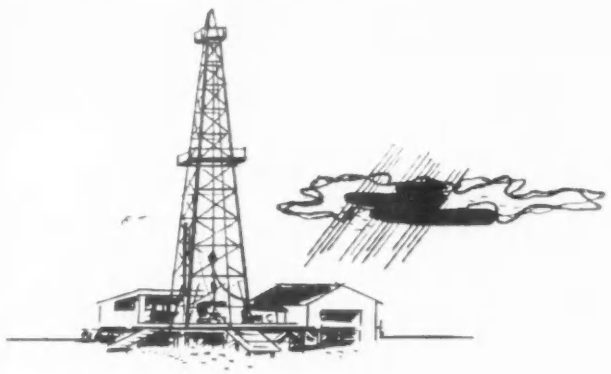
The electric motor is connected to the pump by means of a small cam arrangement so that the rotation of the motor gives the same motion to the pump as is found in the fuel pump of an auto.

A small tank of solvent may be mounted conveniently on the lease truck for supplying the cleaning agent, or it may be taken directly from the fuel tank of the truck. The latter arrangement is more dangerous due to the explosive nature of gasoline.

Controlling Cooling Tower Air Inlet

Regulate the surface of heat exchangers which are exposed to the cool outside air with a canvas shade, thereby controlling to some degree the temperature of the engine jacket water. The illustrated cooling tower is located at a small compressor station that compresses gas for pressure maintenance purposes. In the summer, every square foot of cooling area is needed to maintain the engine jacket water at desired temperatures. A fan inside the enclosure draws air through these large radiators to provide the necessary cooling effect. By exposing all the available radiator surface, maximum cooling can be accomplished.

In the winter months, only part of the radiators is needed to give the necessary cooling of engine jacket water. Some control can be accom-



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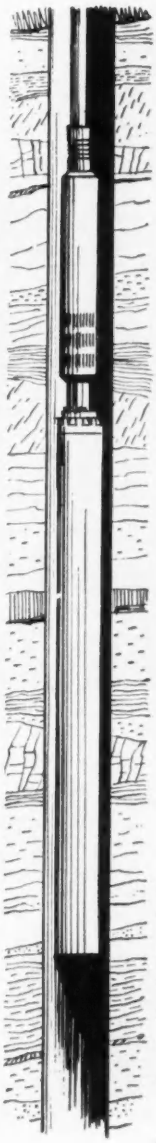

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plished by covering up part of the radiator exposed to the flow of air through it by lowering a canvas shade to any level required.

A small winch device (in left background) set up adjacent to the radiators aids in regulating the shade. The cable which lowers and raises the canvas shade as a porch blind is adjusted, is wrapped around the hand winch reel. This reel can be locked in any desired position by placing a bolt through matching holes in the reel and supporting legs.

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• Share your ideas for a better way to do or make something. Send a picture illustrating your idea with a written description to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

Adding Blow-Off Line

Add a safety blow-off line in a gas system to handle excess volumes of gas occasionally encountered from the separator. The meter run shown measures the gas coming off the separator of a lease, which gas is taken into a system that may be shut in at times. In order to prevent building up a high back-pressure in the separator when such conditions exist, a blow-off line to a gas flare is added to the meter run.

In this four-inch meter run elevated about 20 inches above ground level, a weight-controlled back-pressure valve is installed to maintain a given pressure on the separator. The four-inch line then goes underground and extends out to the vertical flare line shown in the background.

Immediately downstream of the orifice meter chart mounted on the meter run, a 2½-inch vertical line connects into the bottom of the meter run. This 2½-inch line ties into the gas system which ordinarily takes the gas produced off the separator. Should this system be shut in, pressure will build up in the separator to a predetermined point where the valve opens and blows the gas through the flare. In this manner, the well continues to produce into the separator without undue back pressure on it. When the gas system again takes the gas, the back-pressure valve closes and the gas goes into the system.

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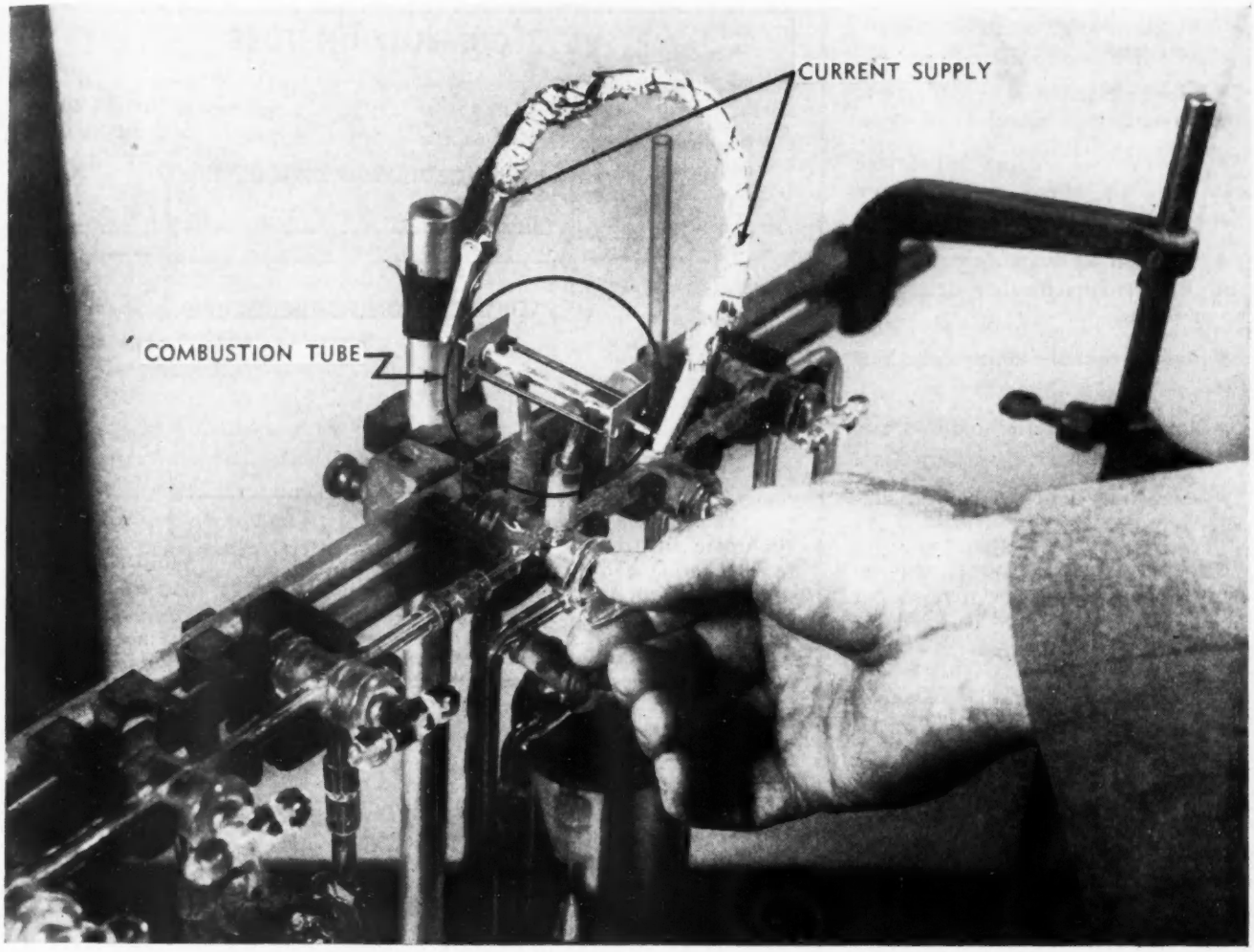


COMBUSTION TUBE mounted on standard laboratory model gas analysis apparatus. Unit can be mounted similarly on a portable field apparatus.

You Can Analyze Gas in the Field

Successful lab tests of this tube likely will lead to a portable Orsat apparatus for rapid combustion on-the-spot analysis.

By MYRON L. ROBINSON, Technical Service Department, Southern California Gas Company

AN EASILY-CONSTRUCTED, two-inch-long quartz combustion tube with an electrically-heated platinum filament has proved safe and reliable for single-pass combustion analysis of natural gas. Likely, this tube is the forerunner of a portable Orsat apparatus for rapid combustion analysis of natural gas in the field.

The device was developed and laboratory-tested in answer to the need for equipment that could be used for on-the-spot analyses of gas in the field. It is based on the theory that when a gas-air mixture is passed over an electrically heated platinum wire a rapid combustion can be performed in a safe manner. Since no such apparatus is commercially available, the new tube may prove helpful to other gas companies.

Here are some of its advantages:

- Rapid one-pass combustion of the constituents of natural gas (three minutes actual combustion time). (If applicable amounts of higher hydrocarbon vapors are present, 1 to 3 additional passes are required to desorb the portion on the walls of the apparatus.)
- Safe combustion even with explosive hydrogen-oxygen mixtures or

natural gas containing up to ten per cent acetylene.

- Rapid heating (30 seconds) and rapid cooling (one minute).
- Low internal volume and surface area keeps the effect of temperature changes and adsorption to a minimum.
- Fairly simple components that are easily disassembled for thorough cleaning or repair.
- Stable, durable unit with long life.
- Not rapidly deteriorated by Orsat fluids.
- Small and light weight, no supports required.
- Low electrical energy requirements (35 watts for three minutes per analysis), batteries may be used for portable field equipment.

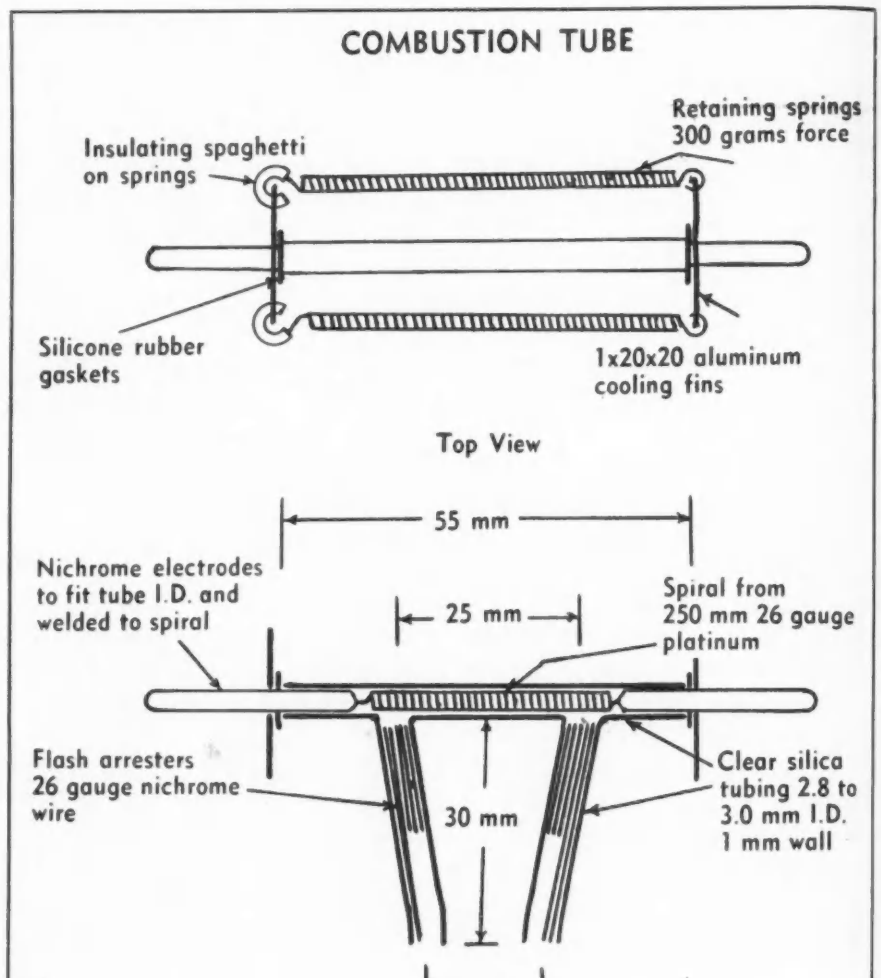


Fig. 1—Orsat combustion tube (actual size).

Construction Detail. After considerable experimentation with pyrex capillary tubing and cement-type glass-to-metal seals, the tube shown in Figure 1 was designed. Basically the unit consists of an electrically-heated platinum spiral in a clear silica tube that is in the shape of the Greek letter "Pi". Extending from the horizontal arms of the "Pi" are electrodes that conduct the current to the platinum spiral which is located between the electrodes. One leg of the "Pi" is the combustion mixture inlet and the other leg the outlet. Both inlet and outlet contain flash-back arresters which are simply tightly packed bundles of inert wire.

The dimensions shown in the drawing are not very critical but were chosen for ease of construction and economy of materials and power consumption of the spiral. The small size clear silica tubing can be obtained commercially. It can be satisfactorily worked in a gas-oxygen flame. The ends of the tube through which the electrodes pass should be ground square on an oil stone in order to make a good seal to the gasket.

The flash-back arresters are assembled by dropping a few lengths of wire at a time into the tube and orderly arranging them to form a compact bundle. The last two or three wires should fit snuggly and be long enough to extend to the open end of the tube to permit easy disassembly.

After the platinum wire has been welded to the nichrome electrodes, the spiral is formed by close winding the wire on a drill rod to give a spiral that loosely fits the inside diameter of the tube. It is necessary to space the first four or five turns at the inlet end about one wire diameter to minimize local overheating on rapid combustion, and to space the remaining turns about $\frac{1}{5}$ of a wire diameter to prevent short circuits. Also, prior to inserting the spiral and electrode assembly into the silica tube, it is important to free the spiral of finger prints with concentrated nitric acid and a water rinse.

The removable gas-tight seals between the electrodes and the silica tube are silicone rubber washers cut from one to two millimeter sheet stock, with cork bores, to fit tightly on the electrodes. Each seal is pressed against the end of the tubing by two small tension springs that are attached to the cooling fin riding loosely on each electrode. One end of each spring is covered with plastic insulating spaghetti to prevent short circuiting the current to the spiral.

Arrangement of Orsat. Since the efficient operation of the combustion tube requires that all the combustion mixture be burned in a single pass, the arrangement of the pipettes on the Orsat must be changed to permit passage of mercury into the combustion tube as far as the flash-back arresters. The recommended order of the com-

ponents on the manifold from left to right, or vice versa if desired, is: three-way stopcock for entering and purging with oxygen, caustic filled pipette for absorbing carbon dioxide after combustion, mercury-filled reservoir with leveling bulb, combustion tube coupled to the manifold by a U-tube stopcock, burette assembly of the type with water jacket and compensator manometer,[1] pipette for absorbing oxygen, caustic filled pipette for absorbing carbon dioxide in the sample, three-way stopcock for entering and purging with the sample. Additional pipettes may be added to the right of the burette for other operations on the sample such as carbon monoxide or unsaturants removal. With this logical arrangement all operations pertaining to the sample are carried out on the right side of the manifold, and all operations pertaining to combustion are carried out on the left side, in addition to allowing mercury from either the reservoir or the burette force the combustion mixture through the combustion tube in one pass. The construction of "build up model" Orsat is ideal for this arrangement of the pipettes.

The combustion tube, when mounted on the stopcock, requires no additional support, but the electrical connection to the electrodes should be made through flexible leads and alligator clips in a manner to prevent moving the electrodes to badly deform the spiral. A source of electric current of approximately six amperes at five volts for three minutes per analysis is required. A suitable transformer or battery and rheostat is satisfactory.

Combustion Procedure. The combustion tube is rinsed with water at the start of a days run along with the manifold. Excess water is removed by turning on the current to the spiral while a small flow of oxygen is purged through. The tube is cooled and kept full of oxygen until needed. No deviation from the customary procedure for handling the sample is required up to the point of carrying out the combustion. After the sample and oxygen have been measured and mixed, the mercury from the reservoir is raised to the stopcock of the combustion tube and the stopcock to the reservoir closed.

All the combustion mixture is now on the burette side of the combustion tube. The stopcock to the combustion tube is now opened and the heating current turned on. After approximately 30 seconds to allow the spiral to heat, the stopcock to the reservoir is opened and the sample burned at a rate of not over 70 milliliters per minute. The inlet end of the spiral will glow more brightly when combustion is taking place. Allow the mercury in the burette to rise to the flash-back arrester. Burn the last traces of sample in the arrester by lowering the mercury a couple of milliliters and again raising it to the arrester. The current is turned off and the combustion products are transferred through the combustion tube to the measuring burette. Allow about one minute for the tube to cool before making the final pressure balance and reading of the volume.

Results and Discussion. The result from use of the combustion tube for analyses of natural gas are shown in Table 1. Generally one pass through the combustion tube is sufficient, but if the sample contains more than a couple of percent of hydrocarbons higher than ethane, one to three additional passes may be necessary to sweep the portion adsorbed on the walls of the Orsat through the combustion tube. These passes should be made at less than 30 milliliters per minute to prevent excessive cooling of the spiral. The tube has not been tested on vapors higher than n-heptane, but it is believed that no difficulty should be experienced with any of the constituents of gasoline vapors if precautions are taken to prevent losses by adsorption in the sampling and analytical equipment.

In making tests on the flash-back arresters, it was found that flash-back of natural gas-oxygen or hydrogen-oxygen mixtures could be prevented with a bundle of 26-gauge wire, but explosion of pure acetylene-oxygen mixtures was not prevented. Ten percent of acetylene in the natural gas was safe. Although 30-gauge wire did control the acetylene-oxygen mixture, the resulting restriction to the gas flow by such fine wire prevented it from being used in the combustion tube.

No estimate can be made on the life of the combustion tube since none built of quartz have been worn out. After an estimated operating time of 20 hours total for three spirals, no serious deterioration of the platinum has been noted. The quartz tube frosts on the interior from the heat and eventually blackens from minute amounts of platinum. Hot aqua regia rapidly removes the platinum stains. In event the spiral becomes completely fouled in a manner that can not be remedied by rinsing with mild reagents and water, the spiral should be removed, cleaned with strong reagents and heated to a bright white heat before reassembling.—**The End.**

TABLE I
Results with Combustion Tube on Natural Gas

Calculated Approximate Composition (Percent) (1) (2)			Analysis No.	Composition Found by Combustion[2] (Percent)				
				Methane	Ethane	Nitrogen	Btu.	Sp. Gr.
Low Ethane Sample	Methane	98.8	1	98.4	0.5	1.1	1001	0.562
	Ethane	0.2	2	97.5	0.7	1.8	1003	0.565
	Nitrogen	1.0	3	99.4	0.0	0.6	1010	0.558
	Btu.	1000	4	98.7	0.1	1.2	1003	0.560
	Sp. Gr.	0.558						
High Ethane Sample	Methane	78	1	77.3	17.7	4.8	1101	0.664
	Ethane	17.5	2	78.6	17.4	3.8	1109	0.658
	Nitrogen	4.5	3	77.6	17.8	4.4	1105	0.663
	Btu.	1098	4	75.9	18.6	5.3	1103	0.670
	Sp. Gr.	0.663	5	78.0	17.1	4.7	1098	0.661
			6	76.9	17.8	5.1	1099	0.666

(1) Composition based on calorimeter Btu. and gravitometer sp. gr.
(2) Carbon dioxide, oxygen and other minor constituents not shown.

REFERENCE

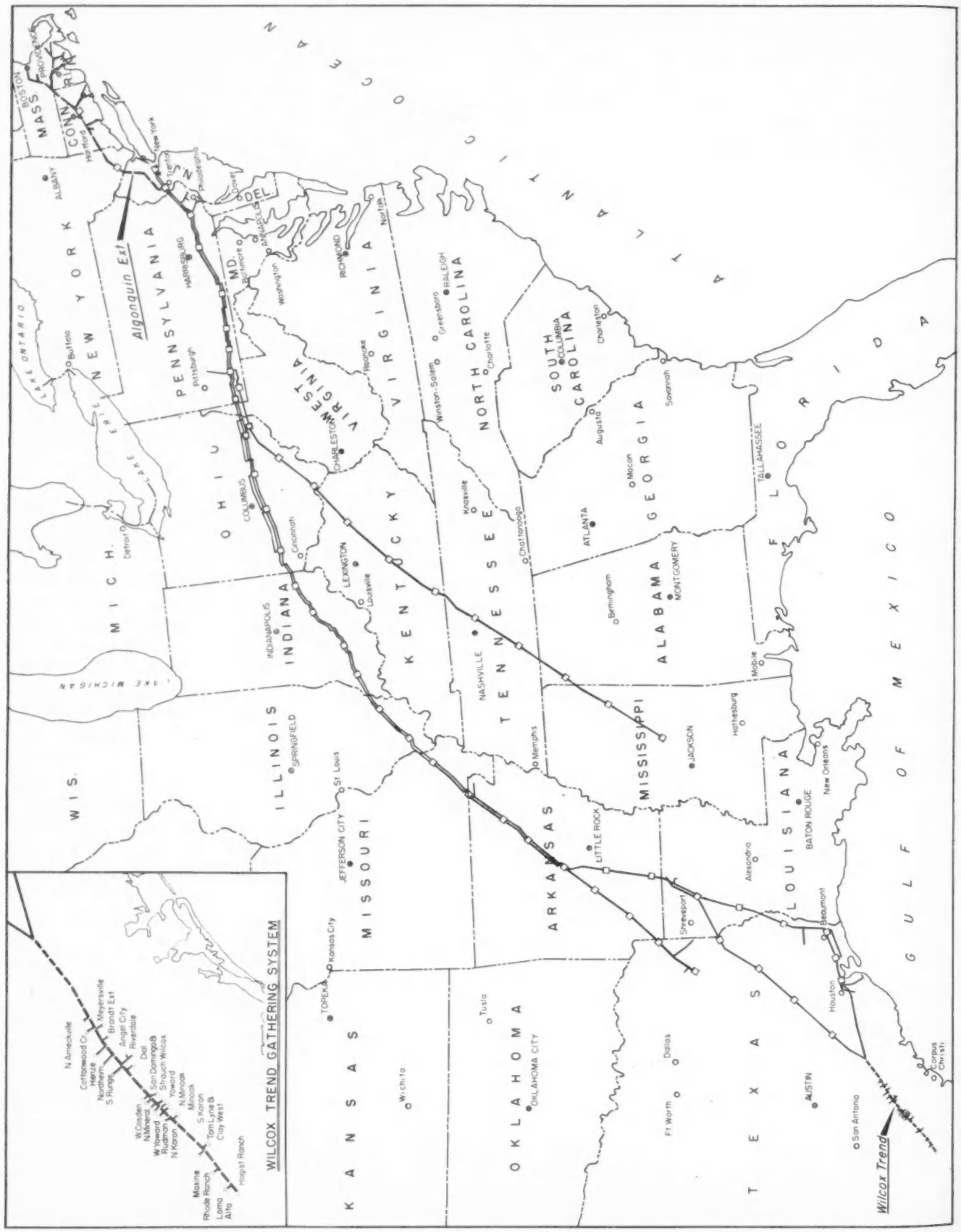
[1] It has been found helpful in rapidly and accurately balancing the pressure in the burette to use dibutyl phthalate in the compensator manometer. Since the sensitivity is increased about 15 times by this fluid, it is advisable to put a pressure manometer on the mercury in the burette to prevent blowing the dibutyl phthalate. This pressure manometer, which is tied to the water jacket, is merely a three foot long glass tube open at the top and connected at the bottom, by means of a tee, to the rubber tube leading from the burette to the leveling bulb. When the mercury levels in the burette and this manometer are the same, the pressure in the burette is atmospheric.

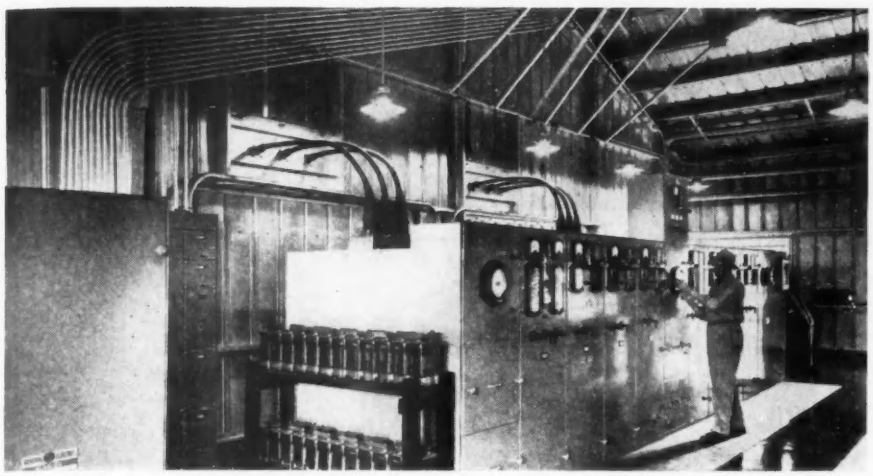
ACKNOWLEDGMENT

This article taken from a paper presented at Pacific Coast Gas Association, Technical Section, Los Angeles, Feb. 18-19, 1953. The author expresses thanks to other members of the Southern California Gas Company chemical laboratory and in particular Frederick J. Folmer for valuable assistance in designing and testing the combustion tube.

Map of the Month

TEXAS EASTERN TRANSMISSION CORP.





CHANGING A CHART on switchboard at Texas Eastern Transmission's centrifugal compressor station near Pollard, Ark. Electric panels of this type play an important part in maintaining TET's service.

TET Turns 'Big Inch' Into a Big Operation

TURNING A 24-INCH crude line and a 20-inch products line into a successful natural gas pipe line system that operates in the black is quite a trick. Especially when the lines cost $143,127,000. But that's what Texas Eastern Transmission Corporation did with the two fabulous World War II veterans, the "Big Inch" and "The Little Big Inch."

Not only that, they have added to the system, until today it is 4533 pipe line miles long and has a total horsepower of 357,410. These latest totals were reached on August 1, when the company placed 305 miles of new 24-inch line in service.

On the same day a subsidiary company was placed in service, the Wilcox Trend Gathering System, Inc. This gathering system extends along the prolific producing area in Southwest Texas, known as the Wilcox Trend. It runs from Duval County in the lower Gulf Coast more than 145 miles to Provident City where Texas Eastern begins. It went in operation with 90 miles of laterals that tie it to about 30 different fields—and this is remarkable in an area where uncommitted gas is getting scarcer.

Thus, a company that will not reach its 7th birthday until Jan. 30, 1954, continues to grow.

It started back in 1947, when the War Assets Administration put the two lines on the block with the avowed intention of getting the highest price possible. The lines had been constructed in the early war years to offset the submarine menace that was plaguing tankers that supplied fuel and crude to the eastern seaboard. The big 24-inch line that had a capacity of 300,000 barrels of crude extended 1254 miles from Longview, Texas, to Phoenixville, Penn., where it connects with two 20-inch lines, one to Philadelphia, the other to Linden, N. J. The small line ran 1479 miles from Beaumont, Texas, to Linden. Its capacity was 235,000 barrels of gasoline per day. Where the two merged at Little Rock, they shared a common right-of-way; and, for that matter shared pump station sites. In all, there were 57 pump stations located at 34 separate sites.

At the time of the purchase, the lines were under lease, being used to transport another company's natural gas at the rate of 140 million cubic feet per day, operating without compressor stations. Texas Eastern was faced with the immediate problem of renovating the lines and adding compressor horsepower.

It was obvious at this point that a workable centrifugal compressor could greatly reduce the cost of adding horsepower, since it would permit the use of electric motors switch-gear already installed in the pump stations. Company engineers approached a centrifugal pump manufacturer, and by September, 1947, the first model high-pressure centrifugal compressor ever to operate on a high-pressure natural gas pipe line was in service.

By the time the new company's first birthday rolled around, the system was delivering 340 Mmcf of gas per day, and on the second birthday, it was delivering 508 Mmcf. Compressor horsepower was about 180,000, with only about a quarter of this amount in conventional reciprocating engines.

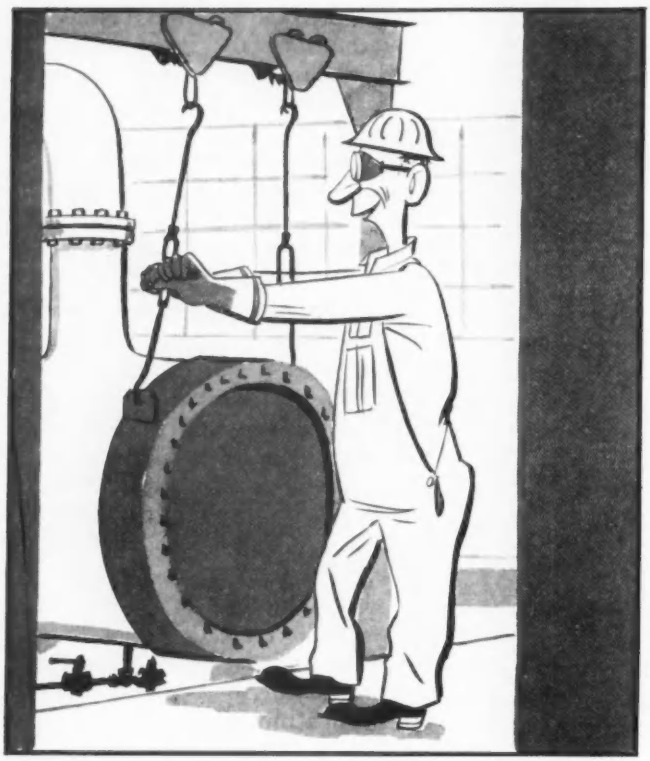
In 1949 Texas Eastern renovated the 20-inch line by testing it hydrostatically with pressures well in excess of operating pressures. By this procedure defective joints of pipe were revealed and replaced. The same year, loops and compressor horsepower were added as well as underground gas storage at Oakford field, 30 miles southeast of Pittsburgh. Capacity on the third birthday was 740 Mmcf.

On Feb. 27, 1951, the FPC approved a proposed expansion program that called for a 30-inch line to be laid from Kosciuske, Miss., 774 miles northeast to connect with the existing system near Connellsville, Penn. This new system went into operation Aug. 1, 1952. It had an initial capacity of about 400 Mmcf per day, that could be easily expanded to 550 Mmcf by the addition of compressor horsepower. In the fall of 1952 the system's daily delivery capacity passed the billion mark.

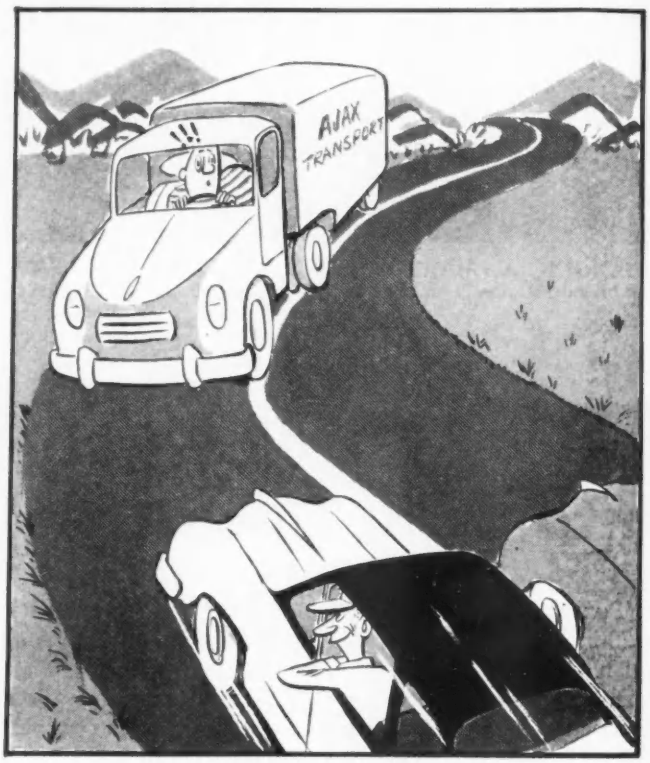
Another important part of the company is its subsidiary, Texas Eastern Production Corporation. It is rapidly becoming a major oil and gas producer.

Officers of Texas Eastern Transmission Corporation are: George R. Brown, chairman of the board; R. H. Hargrove, president; Chas. I. Francis, vice president and general counsel; George T. Naff, first vice president; C. L. Brockschmidt, vice president (Gas Sales); Walter E. Caine, vice president and treasurer; Orville S. Carpenter, vice president and comptroller; Mills Cox, vice president (Gas Supply); E. R. Cunningham, vice president (Operations); B. D. Goodrich, vice president and chief engineer; J. W. Hargrove, secretary and assistant treasurer.

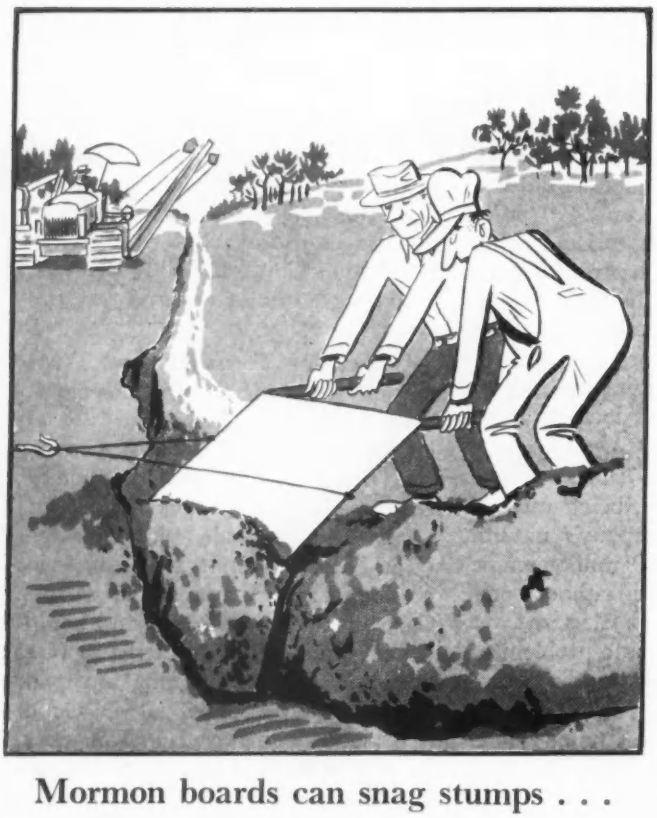
Perils of Pipeline Pete



He's super safe at work . . .



. . . but on the road, what a jerk!



Mormon boards can snag stumps . . .

. . . stand clear, or take the bumps!

Rules of Thumb

FOR THE PIPELINER'S NOTEBOOK

These formulae from the pages of engineers' own notebooks yield rough, but reasonably accurate answers for design, maintenance and supply questions. Use them for quick calculations to solve your everyday pipe line engineering problems. If you have a pet Rule of Thumb, share it with others by sending it to Donald M. Taylor, Pipe Line Editor, WORLD OIL, P. O. Box 2608, Houston 1. The rules are being numbered according to subjects to aid classification when published in book form and to help you, the reader, file them in your notebook.

Pipe Line Construction

—7—What is the cost of asbestos felt for a mile of pipe?

Multiply the diameter by one-half cent. (This does not include freight.)

Example: Find the cost of pipe line asbestos felt used in wrapping a mile of 20-inch pipe line.

$20 \times \frac{1}{2} = 10$ cents per foot.

Cost per mile is 5280×10 cents = $528 plus freight.

The cost for fiberglas will run just slightly less than this amount.

Of course, this cost is only approximate and will vary. Often the freight charges should be considered in any estimate.

Miscellaneous

—8—How to find the resistance and weight of copper wires.

It is easy to calculate mentally the approximate resistance and weight of standard sizes of copper wires, by remembering the following rules:

Rule 1: Number 10 wire has a resistance of 1 ohm per thousand feet. Number 2 wire weighs 200 pounds per thousand feet.

Rule 2: An increase of ten numbers in the size is an increase of ten times in the resistance, and a decrease to one-tenth of the weight.

Rule 3: An increase of three numbers in the size doubles the resistance and halves the weight.

Rule 4: An increase of one number in the size multiplies the resistance by 5/4 and the weight by 4/5.

Always proceed from the known value (No. 10 for resistance, No. 2 for the weight) in the smallest number of jumps; that is, go by tens, then by threes, and finally by ones; the jumps do not all have to be in the same direction.

Example: What is the weight and resistance of 200 feet of No. 18? Apply the rules in order, as follows; resistance first:

Number *10* wire has a resistance of *1 ohm* per *thousand feet.* (Rule 1)

Number *20* wire has a resistance of *10 ohms* per *thousand feet.* (Rule 2)

Number *17* wire has a resistance of *5 ohms* per *thousand feet.* (Rule 3)

Number *18* wire has a resistance of *6.25 ohms* per *thousand feet.* (Rule 4)

Number *18* wire has a resistance of *1.25 ohms* per *200 feet.* Answer.

Number *2* wire weighs *200 pounds* per *thousand feet.* (Rule 1)

Number *12* wire weighs *20 pounds* per *thousand feet.* (Rule 2)

Number *22* wire weighs *2 pounds* per *thousand feet.* (Rule 2)

Number *19* wire weighs *4 pounds* per *thousand feet.* (Rule 3)

Number *18* wire weighs *5 pounds* per *thousand feet.* (Rule 4)

Number *18* wire weighs *1 pound* per *200 feet.* (Answer)

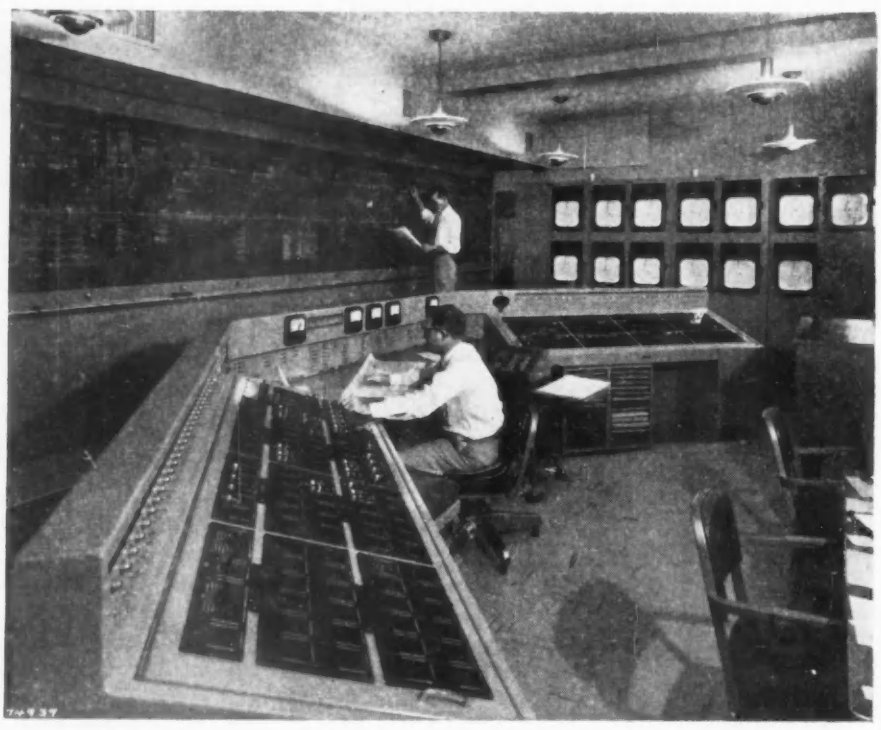
Of course, the weight determined by the above rules is that of bare copper wire. Weight of insulated wire varies widely according to the type of insulation. Resistance values are correct for bare or insulated wire, and for solid or stranded. Errors resulting from the use of the rules will rarely exceed 2 percent.

WHAT'S HAPPENING

IN PIPE LINE CONSTRUCTION

By **THERESA K. MARTIN,** WORLD OIL Staff

LINING UP the 40-foot sections of 20-inch steel pipe for the new Platte Pipe Line which is now transporting over 100,000 barrels of crude oil daily. Following the lining up of sections, the line joints are tacked, then welded. After thorough cleaning, various coatings of enamel, tar, spun glass and paper are applied to prevent corrosion after the line has been buried.



FROM THIS CONTROL ROOM in Platte Pipe Line Company's headquarters in Kansas City, Mo., one man can supervise and control Platte's 1149-mile crude line from Wyoming to Illinois. The all-electric line includes a 44-station microwave system which provides nine channels for instant communication along the line.

Platte Dedicates New All-Electric Crude Line

Dedication ceremonies were held August 8 for America's newest and first all-electric major diameter pipe line for transporting crude oil. It is the 1149-mile, 20-inch carrier of the Platte Pipe Line Company, capable ultimately of delivering 150,000 barrels daily of Rocky Mountain crudes, and it runs from the western edges of Wyoming to Wood River, Ill.

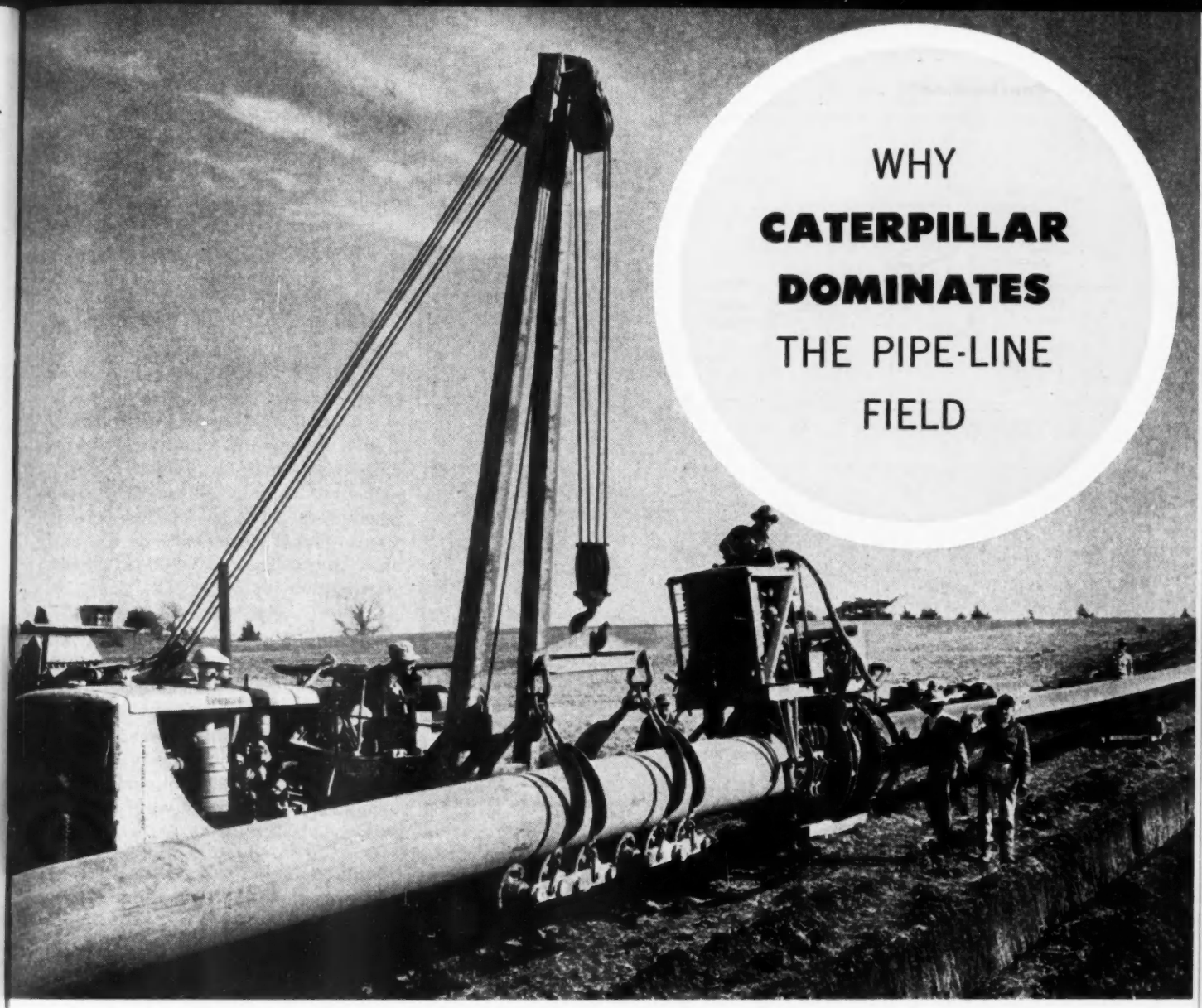
Five companies, The Ohio Oil Company, Sinclair Oil Corporation, Continental Oil Company, The Pure Oil Company, and The British-American Oil Company, Ltd., joined forces in multiple ownership to build the common carrier line.

See map on Page 256.

The all-electric line includes a 44-station microwave system which provides nine channels for instant communication along the line from Casper to Wood River, and from Platte headquarters in Kansas City. By means of this system, it is possible in Platte's central headquarters to read and record pressures, to start and stop motors and pumps, to open and close valves, and to determine fluid levels in tanks at remote points on the line.

Sun Pipe Line Awards Toledo Line Contracts

Sun Pipe Line Company has awarded two contracts for laying a 49-mile, eight-inch products line from Toledo, Ohio, to Inkster, Mich., to tie in with an existing spur to River Rouge. Coolsaet Construction Company will lay 41.3 miles from the Ohio state line to Inkster Junction, west of Detroit. Poston Pipe Line Corporation will handle the remaining 7.7 miles from the Ohio state line to Toledo. Completion is scheduled for October 1. Estimated cost is $1.3 million, and the daily capacity of the line will be 20,000 barrels.



WHY **CATERPILLAR DOMINATES** THE PIPE-LINE FIELD

You win confidence of veteran pipe-line construction men only by producing results. That's the reason Caterpillar is the No. 1 pipe-laying equipment in the nation.

Look at the big yellow MDW8 in the picture. Owned by Houston Contracting Co., it's doing a job quickly, dependably, economically on the 455-mile Rancho Pipeline System in Texas. It should. It was built with pipe-laying problems specifically in mind. The improved hydraulic controlled counterweight permits operators to balance the unit without leaving their seats.

And the special creep gear. This allows the MDW8 Pipelayer to use full power on boom and load line drums while the unit paces itself with the cleaning and priming or doping and wrapping machines.

Whether you use efficient Cat* equipment in your spread for clearing right of way, lining up, lowering in or backfilling, you have advantages no other equipment can offer. All dependable Caterpillar Engines operate on inexpensive No. 2 furnace oil and do it without fouling. In the coldest weather, they offer positive starting.

No matter where you are, you get the advantage of quick, efficient Caterpillar service. So be wise: standardize.

Your dealer can demonstrate the advantages of Caterpillar equipment on your job. Just name the date!

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

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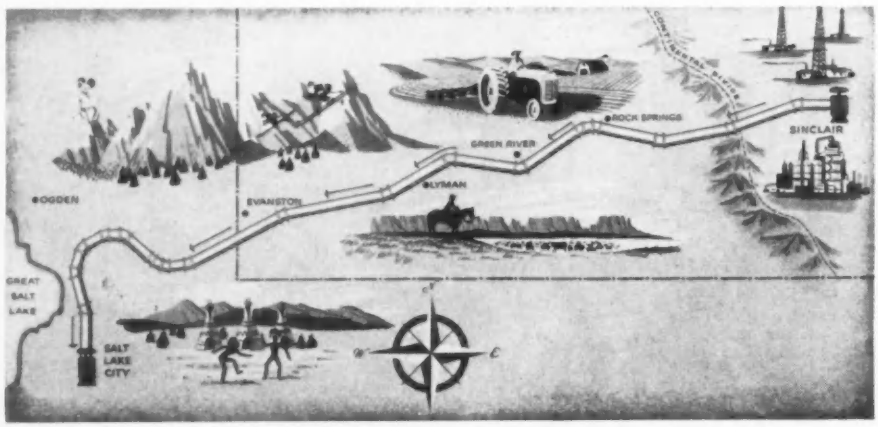
NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

PLATTE PIPE LINE's new line carries crude from Wyoming to Illinois.



Pioneer Pipe Line route

Wyoming-to-Utah Line Dedicated

Dedication ceremonies were held August 10 for the Pioneer Pipe Line, which runs from Sinclair, Wyo., to Salt Lake City, Utah.

General field work for the 290-mile, eight-inch line was begun in March 1952, and construction got underway in August. Although work was not completed, the system was placed in limited operation and the first shipment of oil reached Salt Lake City on January 4, 1953. Present capacity, with one pump station at Sinclair, is 12,000 barrels daily. Provision has been made for the addition of a second station, if needed, which would boost the daily capacity to 18,000 barrels.

Pioneer Pipe Line Company is owned by Sinclair Pipe Line Company, 35 percent interest, and Continental Oil Company, 65 percent interest. The line was built by Sinclair and is being operated by Continental Pipe Line Company, a subsidiary of Continental Oil Company.

Near Salt Lake City the new pipe line connects with the Salt Lake Pipe Line Company's system, through which it delivers products to the Snake and Boise River valley areas in Idaho and Eastern Oregon and in the Columbia River Basin of the Pacific northwest at Pasco, Wash. Terminal outlets in the Snake and Boise River valleys are located at Burley and Boise, Idaho.

Speakers at the dedication ceremonies were President J. Reuben Clark, Jr., member of the First Presidency of the Mormon Church; James W. Liddell, president of Pioneer Pipe Line Company; P. C. Spencer, president of Sinclair Oil Corporation; L. F. McCollum, president of Continental Oil Company; and W. R. Argyle, vice president of Sinclair Refining Co.

Trans Mountain Will Build Needed Housing for Workers

Trans Mountain Oil Pipe Line Company has found it necessary to arrange for the construction of 101 dwellings for its employes in 10 cities and towns along its 718-mile pipe line route. A wholly-owned subsidiary, Trans Mountain Housing Limited will construct and own the houses. Cost of the project will total $1.7 million.

Four Companies Share Yellowstone Pipe Line

Ownership of the new 540-mile Yellowstone pipe line from Billings, Mont., to Spokane, Wash., plans for which were revealed last fall by Continental Oil Company, will be shared by Continental, Interstate Oil Pipe Line Company, Union Oil Company of California and the H. Earl Clack interests.

The $20 million line will be built and operated by Yellowstone Pipe Line Company, in which Continental Oil Company and Interstate Oil Pipe Line Company, an affiliate of Standard Oil Company (N. J.), each own a 40 percent interest. Union Oil Company of California and the H. Earl Clack interests each hold a 10 percent ownership.

The 10-inch pipe line will carry refined oil products from Conoco and Carter Oil Company refineries at Billings to consumers served by terminals at Bozeman, Helena and Missoula, Mont., and Spokane. It is hoped to have the line in limited operation by the end of this year, with completion scheduled for the summer of 1954.

Kansas-Nebraska Seeks FPC Approval of 41-Mile Line

Kansas-Nebraska Natural Gas Company, Inc., of Phillipsburg, Kan., seeks FPC authority to construct a total of 41 miles of pipe line and other related facilities on its natural gas transmission system in Kansas and Nebraska.

Total cost of the project is $922,410. The proposed facilities are designed to increase the company's capacity to receive and utilize gas from additional reserves in Logan County, Colo. pools. They also would enable the company to serve three new alfalfa mills, at Albion, Arcadia and Broken Bow, Neb., and a railroad engine house at North Platte, Neb.

In addition, the application requests the FPC to modify a previous certificate issued to Kansas-Nebraska, to eliminate the authorization for construction of a total of about 98 miles of pipe line in Kansas. The company said that these lines will not be needed because the increased capacity proposed in the new application would replace the increases to be accomplished by their construction.

El Paso to Purchase Lines From West Texas Gas Company

An FPC examiner's decision gives El Paso Natural Gas Company authority to acquire pipe line facilities from West Texas Gas Company, of Lubbock, Texas, upon the condition that El Paso shall either adopt West Texas' 13½-cent-per-thousand cubic foot rate, or, if it charges the 15½-cent rate it proposes, shall collect the increased amount under bond and subject to refund, as it is doing in a general rate increase case applicable to its existing system now pending before the FPC.

El Paso plans to purchase approximately 66 miles of line extending from a point near Umbarger, Texas, to near the Texas-New Mexico state line, about 45 miles of line between Amherst, Texas, and a connection with the 66-mile line in Parmer County, Texas, and a 600-horsepower compressor station near Hereford, Texas. These facilities are now used by West Texas to supply natural gas to Southern Union Gas Company of Dallas. The gas which West Texas now sells to Southern Union is purchased from El Paso, and the transaction would eliminate West Texas as a "middle man" in the operation.

El Paso would pay $287,389 for the facilities and in addition would acquire 445 feet of line from Southern Union and construct a new metering station at the point of delivery to Southern Union estimated cost $3500.

Colorado Interstate Gas Gets Approval on Expansion

The FPC has authorized Colorado Interstate Gas Company of Colorado Springs, Colo., to construct pipe line facilities in Colorado, Oklahoma, Texas and Kansas to increase the sales capacity of its natural gas transmission system.

The construction program includes 49 miles of 20-inch main line loop, and 18,920 horsepower at new or existing main line compressor stations. The project also includes a total of 35 miles of 12 and 16-inch pipe and 5940 hp in supply facilities, 37 miles of eight and 16-inch sales laterals, and 112 miles of four to 20-inch field pipe lines.

Estimated to cost $19.8 million, the project will increase the sales capacity of the company's system by 82.5 million cubic feet of natural gas per day by the 1953-54 winter season.

TOUGH PIPELINING takes place on Tennessee Gas Transmission Line in western Pennsylvania. A sideboom cradling pipe on H. C. Price spread is in deep mud after heavy rains had turned the right-of-way into a quagmire. Photo was taken by Curt Johnson, chief inspector for the Tennessee Gas Transmission Company at Oil City, Penn.

Tennessee Adds 135 Miles of Line

Tennessee Gas Transmission Company's progress reports on 1953 construction showed more than 135 miles of the 368-mile pipe line construction program completed. The new compressor station near Kinder, La., was nearing completion, while enlargement work was proceding at station 214, near Carrollton, Ohio, and station 219 near Mercer, Pa. In Texas, all the 94 miles of loopline planned to be built this year has been completed. In Louisiana, right-of-way was being cleared for a 22-mile, 30-inch section of loopline from near Natchitoches to near Goldonna.

Nine miles were completed of a 47-mile, 30-inch section of loopline from about 20 miles north of Nashville, Tenn., to near Bowling Green, Ky., and construction was beginning on an 18-mile, 30-inch section of loop from south of Bolivar to near Selmer, Tenn. Work was underway on a 35-mile, 30-inch section of loop from near Campbellsville, Ky., to near Danville, Ky., and on a 21-mile, 26-inch section from near Carter, Ky., to the Ohio River.

In Pennsylvania, work was going forward on two spreads constructing 131 miles of 24-inch line between Mercer and the Hebron storage field.

Evangeline Line River Crossings Contract Let

A contract has been awarded by The Texas Pipe Line Company for the construction of 16-inch products pipe line crossings of the Mississippi River at Baton Rouge and the Atchafalaya River near Krotz Springs, La., as part of the Evangeline Products System.

The crossing jobs were let to Panama-Williams Corporation, Houston, and J. Ray McDermott Company, Inc., Harvey, La., jointly.

Evangeline Products System pipe line, extending 194 miles from Port Arthur to Baton Rouge, is owned on an undivided interest basis by The Texas Pipe Line Company, which is constructing the pipe line for all interests, Gulf Refining Company and Sinclair Pipe Line Company.

Interstate Lets Contract to River Construction Corp.

River Construction Corporation has started laying 107 miles of 22-inch crude line between Shreveport and Baton Rouge, La., for Interstate Oil Pipe Line Company. Completion is expected by October 15, assuming that pipe deliveries are made on schedule. The new line is part of Interstate's program for modernizing and increas-

ing the capacity of its Shreveport-Baton Rouge trunk line system, portions of which have been in service since 1910.

Interstate plans to replace the company's old Weller pump station in Claiborne Parish about 10 miles west of Homer, La., with a modern pump station. Completion is scheduled by November 30. The new station will be equipped with three centrifugal pump units, and numerous automatic and safety controls.

Southern Counties Gas Seeks Authorization for Short Line

Southern Counties Gas Company of California has asked FPC authority to construct a 14-mile 24 and 22-inch line from a point on their 30-inch Blythe-Santa Fe Springs line near Brea to Santa Ana. The proposed line, estimated to cost $879,962, would have a capacity of five million cubic per hour, which is twice the load that can be transported through the existing Orange County supply facilities. The additional capacity is required to meet increasing demands in Orange County, Calif.

Columbia Subsidiaries Apply To Get Gulf Interstate Gas

Four Columbia Gas Systems, Inc., subsidiaries seek FPC authority to construct and operate pipe line facilities which will be used to receive and transport natural gas to be received from Gulf Interstate Gas Company, of Houston, whose 860-mile line was recently approved.

United Fuel Gas Company and Central Kentucky Natural Gas Company, both of Charleston, propose in a joint application to construct 92 miles of pipe line and a 6000 horsepower compressor station. Total estimated cost is $10.6 million. United would build 60 miles of 30-inch line running from its Lanham compressor station in Putnam County, W. Va. to a connection with Gulf's system in Boyd County, Ky. In addition, United would build 26 miles of 20-inch line in Ohio and W. Va. Central Kentucky would connect with Gulf's system in Menifee County, Ky., with a five-mile 20-inch line to its Means, Ky. compressor station.

Ohio Fuel Gas Company would build 69 miles of 20 and 24-inch line, and add two compressor units at an existing compressor station, all in Ohio. Manufacturers Light and Heat Company's project, estimated to cost $3.5 million, would include a total of 72 miles of 16 and 20-inch line, a 1760 horsepower compressor station, two measuring and regulating stations, and gas storage and well lines totaling 38.7 miles in length.

FPC Directs Trunkline Gas To Supply Louisiana Towns

An FPC examiner's decision directs Trunkline Gas Company of Houston to establish connections with the facilities of the towns of Colfax and Boyce, La., and to sell and deliver 600,000 cubic feet of natural gas per day to each community pursuant to an appropriate executed service agreement under the company's tariff on file with the FPC.

Trunkline has assented to the service if the commission finds it to be in the public interest. The towns will construct the connecting laterals and distribution systems, and Trunkline will build only the metering and regulating stations, which are estimated to cost $15,000 each. The decision is subject to review by the commission.

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FPC Accepts Texas Illinois Plan of Financing Expansion

The FPC has accepted the plan of financing submitted by Texas Illinois Natural Gas Pipeline Company, of Chicago, for its recent authorized pipe line system expansion program, but the FPC warned that it will not in the future "look with favor" on a plan that restricts and limits the right of bond redemption.

The company's plan was originally rejected by the FPC, but at the company's request, the FPC further reviewed this matter in view of the fact that Texas Illinois had issued an additional 956,250 shares of common stock and had begun construction of the facilities authorized, thereby incurring large construction obligations, and will lose its present bond purchase commitments unless the plan of finance were found to be satisfactory.

Texas-New Mexico Lets West Texas Line Contract

Texas-New Mexico Pipe Line Company has awarded a contract to McVean and Barlow, contractors of Odessa, Texas, to construct 52½ miles of crude line in West Texas.

The 10¾-inch line will extend from the Basin Pipeline System's Midland, Texas, station northward paralleling the company's 8-10-inch Midland-Sundown main line and terminating in Dawson County, Texas. Work is scheduled to start immediately.

Virginia Company Withdraws Application to Build Line

The Fredericksburg (Va.) Natural Gas Company has withdrawn an application to build a 29-mile line extending to Fredericksburg from a connection in Culpepper County, Va., with the system of Transcontinental Gas Pipe Line Corporation, of Houston. Estimated cost of the project was $746,690, including $316,730 for the acquisition, modification and extension of the existing municipally-owned manufactured gas distribution facilities in Fredericksburg.

The company had been unable to perfect arrangements for a firm supply of natural gas for the project, and because of the uncertainty with respect to the gas supply, the City of Fredericksburg had repealed the ordinance granting a franchise to the company.

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The EREC-TOWER consists of three 24-foot heavy-duty aluminum tower sections that telescope up to 80 feet with the receiving and sending antenna. It is mounted on a heavy-duty trailer that will road at plus 60 m.p.h. Transmitter and receiver can be mounted right on the trailer, crank the collapsed tower into upright position, telescope the tower to 80 feet, press the mike button and start talking.

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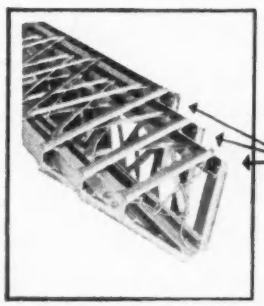

BETTER BUILT

EREC-TOWER is constructed of lifetime aircraft aluminum. Each leg and track (see opposite illustration) is extruded in one solid 24-foot length . . . will not buckle, crack, stick or rust.

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How to do it

PIPE LINE HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

Making Utility Welder's Truck Handy

A nipple of line pipe, slotted for lightness, can be welded to the front bumper of the utility welder's truck to provide a compact place to carry internal line-up clamps and beveling machine.

Brace the pipe nipple far enough from the end to permit the beveling machine to go around the pipe. Then tighten it as if you were preparing to make a weld, and it will stay in place while the truck bumps down the right-of-way. This will keep the machine from being sprung or warped during transport.

To store the line-up clamp, simply run it inside the nipple and tighten it so it will not come out.

The water keg and welding lead rack can also be mounted on the front bumper, as shown in the illustration. Make a receptacle for the keg out of pipe sized to fit its bottom and make the rack for the welding leads out of two-inch pipe. Make the socket for the rack out of three-inch pipe. This lets the rack pivot, and when it is not in use, it can be turned back over the truck.

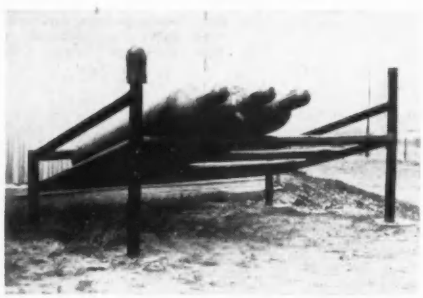
Constructing Swivel Stool

A welder with a few pieces of scrap pipe can construct the stool pictured. Weld four legs of one-inch pipe to a circular piece of ¼-inch steel plate. Prepare braces for the legs out of one-inch pipe. Cut a hole in the center of the steel plate and weld a 1¼-inch U. S. standard nut into the hole.

To make the seat of the stool, weld the 1¼-inch screw to another sheet of ¼-inch steel and cover the seat with rubber or some other suitable material.

Racking Oxygen Bottles

If several dozen feet of two-inch scrap pipe are available and you need a rack for oxygen bottles, this device is the answer. Study the photograph and see how easily it can be put together. The four upright posts of this model are buried in concrete for greater stability.



Aiding Fabrication of Pipe

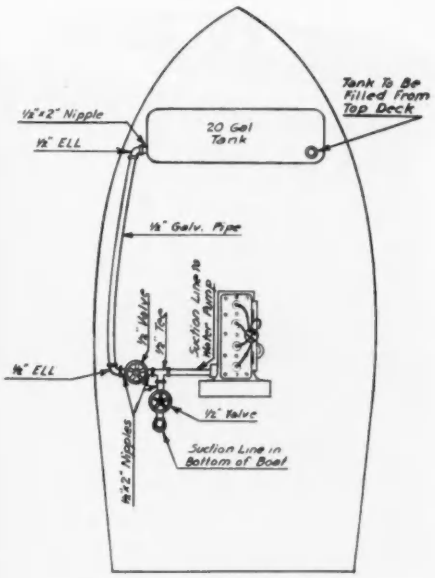
Rubber-clad dollies mounted on pipe sled can speed and improve the utility welding on line and big-inch welding in station yard. At the same time, it provides a safe way to handle pipe without the clumsy skids ordinarily used to hold pipe in place while it is being fabricated.

To make the device, weld or bolt two pairs of dollies onto a sled made of six-inch scrap pipe. Mitre the runners and cover them with light steel plate, so the sled will not dig in when it is being pulled. The resulting skid can be moved easily about the job with a light winch truck.

Saving Truck Tractors From Wear

Mount a fifth wheel to a set of tracks and save truck equipment in country where the going is tough. The fifth wheel will fit all of the trailers—whether lowboys or dope kettles.

And it can work out like this. Let the truck tractors handle the trailers on highways, good roads and firm right-of-way. Then when traveling over boggy roads, transfer the load to the set of tracks, hook up a tow tractor and move right on down the right-of-way.



Cooling Boat Engine

A 20-gallon tank of fresh water hooked into the cooling system on a boat engine can make pipelining on the Gulf Coast area easier. Where lines must be maintained in swamps, bayous or canals that are inhabited by lilies and water hyacinths crew boats often are shut down because cooling water intake lines are clogged. This requires a repair job.

The 20-gallon tank shown in the drawing does not hold enough water for the boat to operate indefinitely in hot weather, but usually it will provide water for the time the boat is in the area. When the boat reaches the edge of the flower-covered section, simply close the valve to the bottom suction and open the valve to the tank.

Indentifying Trucks

Block letters cut from 20-gauge sheet steel and tack welded to the radiator protecting frame are used by one pipe line operating company to

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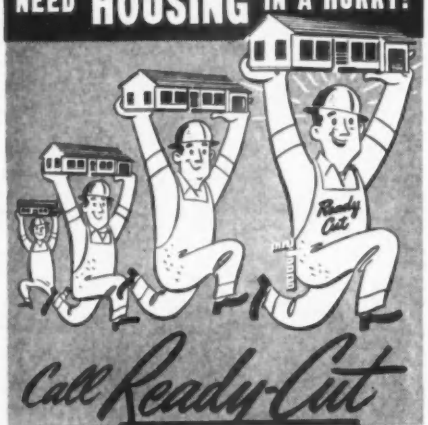

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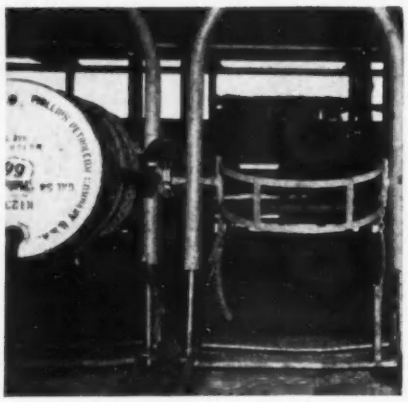
distinguish their field trucks from similar trucks of other companies which operate in the same territory.

The block letters are little trouble to install and they take the place of bracing. Cut the vertical height ⅛ of an inch less than the gap between the upper and lower frame so the letters can be welded.

By making the letters with moderately thin stems and allowing a three-inch space between the letters, air entering the radiator is not appreciably obstructed and overheating of the engine under normal operating conditions does not result.

When painted with aluminum paint, the letters are more readily seen in relatively dim light. And on the job or on the highways, the trucks are readily identified from a distance.

HINTS . . .



Handling Drums

Here's another way to store and handle drums of fuel and oil. With this device the drums can be rolled up into place, clamped around the middle and then rolled over to horizontal position when in use. Moreover, this type rack can be moved easily from place to place.

Make the part of the rack that fits around the midriff of the drums out of strap steel. Tie it at the ends to a piece of pipe which in turn is welded to a short length of pipe that goes through the vertical stanchion. Use a short length of chain with a ratchet lock to go the rest of the way around the drum.

One of the bearing pipes should be welded to a sprocket so the drum can be tilted to a horizontal position and locked, by simply thrusting a short length of pipe into holes in the sprocket and matching rim.

Storing Rods and Bars

Long welding rods will not present a storage problem if this rack is used. Two lengths of scrap pipe, 1½-inches in diameter, are welded to the wall or, if the wall is wooden, they may be bolted. Any number of holders are made by welding short lengths of round bar to the lengths of pipe. Such an arrangement also is handy for storing round bar.

GUNITE COATINGS FOR PIPELINES

One section of "GUNITE" coated 24 inch dual crossing at the Colorado River near Smithville, Texas. We did a similar job at the Brazos River. Reinforced "GUNITE" was placed over a mastic coating.

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TEXAS-TYPE HOUSES at Rumbai in the foreground. In the background, the offices of Caltex Pacific.

Sumatra . . . a Synonym for Serenity

Oil camp life along the equator becomes a kaleidoscope of contrasts in the land where the orchid grows.

The author of this article is an employe of Caltex Pacific Petroleum Mij., the Caltex subsidiary in Indonesia. CPPM under contract with the Indonesian government is developing oil fields on the island of Sumatra in the Indonesian group. Its principal field is located approximately 65 air miles inland from the east coast of Sumatra opposite Singapore.

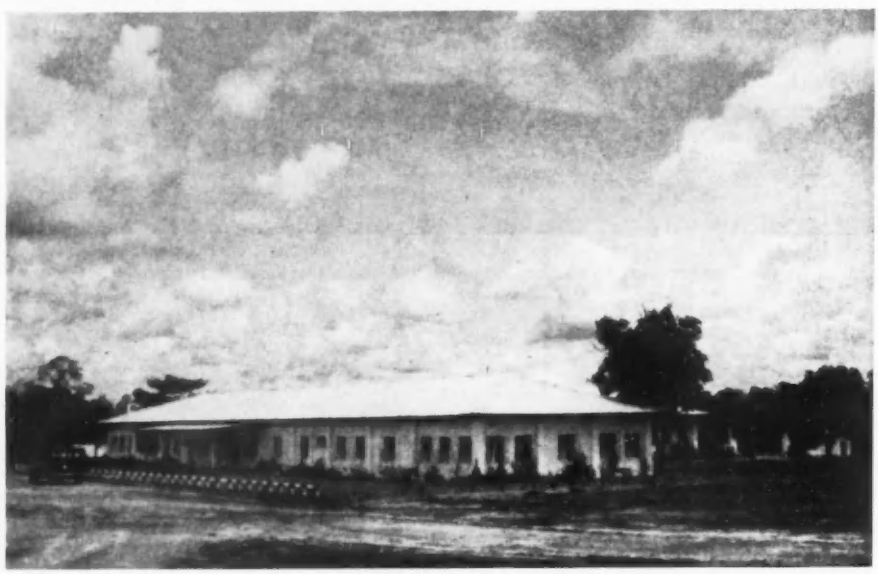
From Minas, site of present production, crude oil is pumped from a central station through 15.5 miles of 12-inch pipe line to a river terminal on the Siak River. From that point it is loaded onto shallow draft river tankers and transported 93 twisting miles down the Siak to an ocean terminal located at Pakning on the East coast. There ocean-going tankers carry the crude to various markets throughout the world.

This article is not intended to be a report on Caltex operations in Sumatra but merely a word picture of life in the equatorial camp situated in the jungle of Sumatra.

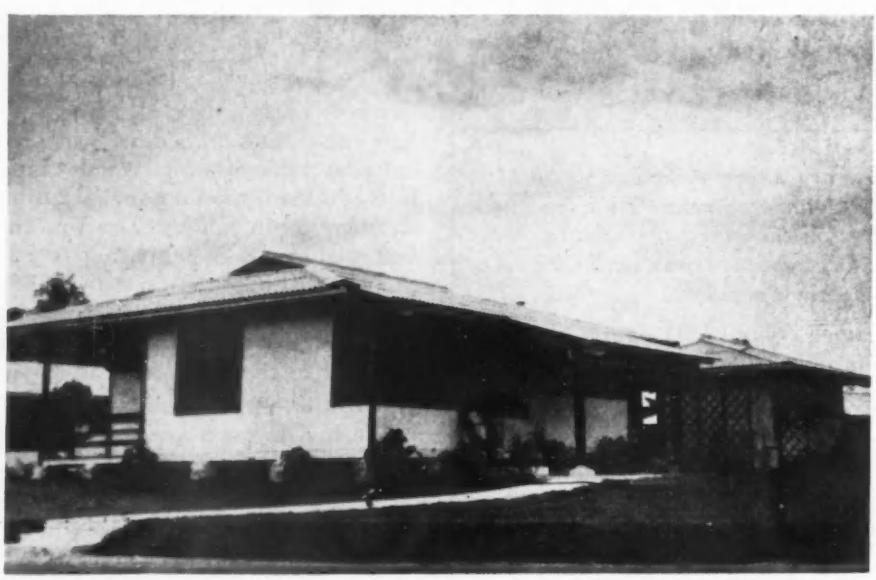
A DEEP BLUE sky dotted with low hanging puffs of white clouds rising in the brilliant morning sunlight from steaming green jungles. This was our first picture of Sumatra as we approached the coast in the Caltex plane, a remodeled C-47, over the Sunda straits that separate forested Sumatra in the north from its populous sister island, Java, in the south.

We had heard a great deal of the legendary splendor of the many islands that comprise the Indonesian archipelago—of the rich emerald jungles where the orchid grows in quiet beauty amidst the lurking dangers of tropical forests. Sumatra, third largest

RUMBAI CLUBHOUSE makes off-duty hours more pleasant for employes.



CALTEX' HOSPITAL at Rumbai affords medical care for workers.



PREFABRICATED HOUSES such as this house staff members.

of the group and fifth largest island in the world, proved no exception to the legend.

Flying in the pleasantly cool atmosphere at 8000 feet, the tropical panorama moved below us. The heavy sullen heat that we had left behind in Djakarta several hours earlier was almost forgotten. But as the plane started to descend, about 30 minutes from destination, Pakanbaru, and the air vents began pouring in streams of warm humid cargo, we recalled noting previously that the Caltex camp was perched uncomfortably close to the equatorial line that almost bisects Sumatra.

The plane gave only a fleeting glimpse of Pakanbaru, before its wheels touched the grass runway. It was a relatively small town, a sprawling collection of grass roofed native houses with market center that boasted large wooden buildings. However, Pakanbaru was civilization and a marked contrast to the miles and miles of uninhabited jungles and swamps over which we had just flown.

Weather Data. A blast of hot air greeted us as we stepped out of the plane into the bright tropical sunshine. This was it—this was Sumatra, and it was only fitting that one of our most constant future companions, the heat, was on the welcoming committee.

Actually, the heat is not as bad as it sounds, but naturally it is one of the first things that impresses you. The average mean temperature at the Caltex camp, a place called Rumbai, is about 84 degrees; the average humidity, a few degrees less. These are almost year round figures. While days are hot, nights are cool, often necessitating the use of a blanket. And the temperature rarely goes over 90 degrees. Oddly enough, the climate in Rumbai is considered definitely cooler than Djakarta, which is farther from the equator and where the annual climate is compared to Washington, D. C., in the summer.

Our arrival in Sumatra was in May—just at the end of what the textbooks refer to as the "rainy season." For half the year Sumatra is considered "dry" hot. The other half it is "wet" hot, although even this description is misleading since there

is very little continuous rainfall as one might imagine in a tropical rainy season. Most of the rain is in the form of torrential thundershowers. The best answer to the weather, we were advised, is to forget it.

Needless to say, however, the weather dictates cool informal clothing; sport shirts and slacks for the men (on formal occasions a tie and perhaps a coat) and cottons for the women. Because of the humidity, woolen clothing must be sunned and aired about once every two weeks to prevent mildew.

It is a good idea to have a summer formal along for local leaves to Djakarta or Singapore, both about three and one-half hours away by plane. Singapore is actually only a little over one-hour flying time away, but Pakanbaru is not an international field, hence flights must be routed through Palembang about two hours to the south.

After passing through customs—every trip by air within Indonesia requires this—we were conducted to company buses waiting to take us to Rumbai, a 45-minute bus-boat-bus journey away. It took about 15 minutes to cover the six or seven miles that separate the airfield—which is the chief means of passenger communication with the outside world—from the town of Pakanbaru. The two-lane asphalt paved road wound carefully between a mixture of prime jungle, small rubber plantations and native farms. Every now and then a sign "Rumah Asap" (smoke house) reminded one that rubber and not oil for many years had been the backbone of Sumatra's economy. The oil fields were relatively newcomers.

Pakanbaru Growing. Shortly, our bus slowed down, approaching the outskirts of Pakanbaru. The settlement itself is about as close to the Indonesian version of an American boom town as you can get. Its present population, about 22,000-25,000, has almost doubled since late 1949, when Caltex post-war operations started in earnest.

Everywhere there are signs of building and expansion, signs that graphically show the influence of the Caltex venture. It is evident, too, that the rapid growth has created the usual numerous social and economic prob-

THESE COMFORTABLE QUARTERS house the women employes.

PICTURESQUE MAIN STREET of the "psar" or market at Pakanbaru.

All Photos Courtesy of Caltex

lems in housing, civic improvements and so on.

Located on the Siak river, Pakanbaru was for centuries an important link on the trade route from Singapore to the west coast of Sumatra. Traders would sail due west with their cargoes of cloth and Chinese porcelain from Singapore to the mouth of the Siak river, where Caltex now has its Pakning crude oil ocean terminal, up the Siak as far as Pakanbaru and then by ox cart over a twisting road through the mountains to the west coast, returning along the same route with gold, ivory, pepper and coffee.

During World War II, the Japanese concentrated a huge labor force in the Pakanbaru area. A narrow gauge railway was pushed through the jungles from Pakanbaru by devious routes, providing for the first time a short lived rail link between the east and west coast. The Japanese also carried on the drilling started by Caltex before the war and managed to bring in several wells in addition to constructing a pipe line of sorts (that was never used) to the east coast. Vestiges of their efforts can still be seen in the area. Several badly rusted "toonerville" type locomotives, flat cars, and torn-up track line the road to the company wharf at Pakanbaru, tombstones to the invader's plans.

At Pakanbaru we transferred to a company launch traveling down the Siak river to the company's wharf at Rumbai. Many of the Caltex Indonesian employes make this same trip every day, since only a small percentage of the workers are housed within the camp at the present. The trip was a pleasant relief from the heat, gliding over the smooth surface between walls of cool green vegetation.

At one time, the banks used to be lined with hundreds of curious monkeys, until the advent of power driven boats frightened them back into the jungles. But the river is more than a respite from a hot journey, it is the most important means of commercial transportation. Over the 90 some odd miles of coffee-colored water that flows between our camp and the Straits of Malacca, shallow draft river tankers, side by side with Indonesian and Chinese junks, ply with their cargoes of crude oil and freight. The Siak, incidentally, is one of the few "black water" rivers in the world. The water is clear except for a tea-like discoloration (a tannic content) caused by rotting trees and other vegetation in the large and tributary swamp areas.

Modern Town. Another short bus ride from the Rumbai wharf and we were inside the camp. The word "camp" is in itself a misnomer, for Rumbai is actually a modern town cut out of the surrounding jungle, complete with its own power plant, 30-bed hospital, water supply, commissary, school, repair shops, warehouses, club, tennis and badminton courts, ice plant, firehouse, and library. Scattered throughout the area and connected by a system of neat oiled roads are clusters of ranch type houses that are "home" for the employes.

The more-recently constructed housing is built on cement blocks about three feet up off the ground for coolness and protection against termites. Each house is designed to accord maximum ventilation, and is completely screened against insect invaders. The company provides basic furniture, rattan type, an ice box and stove. The employe supplies the rugs and curtains—the former best of straw type.

We were advised to bring materials with us as cottons and silk are in scarce supply in Indonesia. As the house we moved into was previously occupied by other company personnel, we had the nucleus of a garden with a scattering of flowers. For some reason, however, it appears difficult to cultivate a garden in Rumbai. A hundred yards from where the enthusiast is desperately nourishing a few blades of grass, the jungle grows in verdant mockery. But each house has ample ground for breathing space, and the climate should be ideal for gardens, if only the proper formula can be found.

Having lived several months in hotels, we were relieved that at last our two small children would not only have "room to run it off" but also playmates. There are 150 non-Indonesian families in the Rumbai area, with 160 children. Caltex has answered the education problem by providing a school and two teachers.

It took us several days to get used to the quietness of the jungle nights after weeks of transient hotel life. The stillness is only rarely broken by the cry of some bird or wild animal, but as dawn breaks one awakens to what appears to be chorus of birds and chattering monkeys singing in symphonic discord. The long nights proved a blessing to our family, particularly since our oldest daughter uses the sun as an alarm clock.

Children, we were told earlier, seem to thrive on the Sumatra climate. And from what one could see there was no reason to disbelieve this statement, although it is not unusual since they get the best of medical care, food and plenty of sunshine.

People Friendly. Once we were settled in the house my wife commenced the task of training servants. The biggest problem encountered was the language barrier. It is almost essential to learn some of the "melayu pasar" in advance. The "Bahasa Indonesia," the higher language, is spoken by the better educated Indonesians, but that contains grammatical and philological ramifications that are not only difficult for the foreigner to learn but often not understood by the servants.

The Indonesian people, we found, are basically very friendly and good natured. Salaries for experienced help run from about 60 rupiahs per month for a wash girl to about 120 rupiahs for a good cook. (The rupiah runs about 11.4 to 1 U. S. dollar). It is also the custom to provide food in the form of rice and fish, in addition to salary, the value of which approximately equals the base pay.

Most of the workers and servants in the camp come from the neighboring Minangkabau and Siak tribes, with a scattering of Batak people and Javanese. The Minangkabau, Siak and Javanese are all of Moslem faith, following the Moslem customs brought in centuries ago by the Arab traders. The Batak is one of the few Christian tribes.

An interesting legend surrounds the Minangkabau people—the name itself means "victory-water buffalo." During the latter part of the 13th century, King Kertanegara, the last of the

rulers of the Empire of Singhasari, sent his Javanese troops to conquer Sumatra and the senescent rival Empire of Shrivijaya. When they encountered the Minangkabau people it was decided, rather than engage in a bloody conflict, to match a Minangkabau waterbuffalo against a like Javanese animal.

The invaders chose their largest and most powerful beast, a huge ferocious animal. But the Minangkabau, seeing the size of the opposition, decided a change in tactics was in order. Instead of an adult animal they selected a young hungry calf, fixing sharp iron spikes to his baby horns. The calf, seeing the larger animal, and probably ignorant of the facts of nature, quickly darted to the side of the bull in search of milk. The end of the larger animal was as quick as it was gory.

The victory gave the Minangkabau its tribal name and thereafter they are supposed to have constructed the roofs of their homes in the shape of water buffalo horns. Not far west from Pakanbaru today, the characteristic homes can be seen, automatically identifying the tribal inhabitants.

Romantic History. The history of Central Sumatra is filled with legends such as these—some true and some fictional. Both the ordinary visitor and the learned sociologist find that the people of Sumatra possess not only a colorful and romantic history, but also a well integrated culture of their own.

In Sumatra one finds vestiges of centuries of Indian, Arabic and Chinese influence and culture. While the island is referred to by the Indonesians as the "young giant," it is not as "young" as the name indicates. The title stems from the fact that its immense wealth in natural resources, rubber, oil, coal, and other materials, was only tapped during the last 75 years or so.

As modern as the camp at Rumbai is, hardly a week goes by that some incident occurs that reminds one of the jungle surrounding. Only a few weeks before we arrived, the "jeep" of one of the American geologists was literally pushed off the road at night time by a bull elephant trying to protect his mate and baby. He escaped by fast maneuvering but not before the elephant had pushed in and broken the jeep's windshield.

This feature, one of a series describing important oil camps or cities throughout the world, is intended only to describe living conditions and to give a bit of the local atmosphere. While an occasional one of the features may touch lightly on working conditions, it will do so only incidentally.

Actually, the elephant was probably merely exercising his jungle right of way, for most of the roads which the company has built to the oil fields follow along paths that were initially broken by elephants. And only shortly before this incident, a tiger attacked one of the Caltex Indonesian employes, leaving lacerations that necessitated 60 stitches.

These episodes, while frequent, are rarely serious and most of them humorous. On several occasions, the Caltex planes have had to circle the landing field at Pakanbaru while airfield personnel in jeeps and on foot desperately try to clear the runway of, uniquely enough, wild pigs. Most of the older Caltex camp residents have never seen a tiger or an elephant.

One of the truly bright spots in the Rumbai camp is the commissary. The company runs several of these, both for nationals and foreign staff, handling over 1265 items. Almost all of the food and liquor is imported from the United States or Europe. The list includes all types of canned goods, frozen meats, fruit, baby foods, and even fresh butter. Prices on the average are at company cost and are somewhat lower, in most cases, than in the States. Some fresh vegetables are purchased locally, but these are either peeled or boiled or treated before eating.

The company handled over $2 million worth of commodities in this fashion last year alone. Coming from our last foreign assignment where occidental type foods were extremely expensive *if available*, the company commissary proved a real blessing.

Club for Employes. One of the weaker points in Rumbai lies in the field of recreation and amusement. This is particularly bad since there are no nearby cities one can visit for diversion. There is an employes' club, with a pleasant bar and library, where movies are shown twice each week. Formal dances are held as often as feasible, on the average of once every three or four weeks. But juke box dances of a spontaneous nature are weekly occurrences.

There are one tennis and several badminton courts plus several self-styled swimming holes. But although the recreation side of Rumbai life is not all that one could wish, plans for a new and larger club, a swimming pool, more tennis courts, and even a short pitch/putt golf course are under consideration. For an oil camp that is only three years old, Rumbai is doing quite well and will improve as it grows.

Unfortunately, there are no religious facilities except for the Moslems. About once every three or four months a Catholic priest or a Protestant minister visits the camp, conducting services in English. Since the radio reception is fairly poor and none of the local stations carry religious programs, the average family must improvise its own religious curriculum. As an answer to some of these problems we brought along a radio-phonograph with a goodly supply of long playing records and a tropical pick up. The library is fairly well stocked, but our own "stateside" magazine subscriptions were welcome additions.

Taking everything into consideration, living in Rumbai is both reasonable and comfortable. As in almost all foreign assignments there are advantages and disadvantages, but the only real drawback to Sumatra life, in so far as Rumbai is concerned, is the generally monotonous nature of the climate and lack of recreation. However, for those people who prefer a quiet life and want to save money, Rumbai is the place. Indonesian taxes are high, higher than in the U. S., but Caltex, like most other companies operating abroad, usually makes adjustments in consideration of this point.

Sitting in the coolness of the tropical evening watching the sunsets —they are supposed to be among the most beautiful in the world—one can achieve a peace and relaxation that is rarely, if ever, equalled in northern climates. It is said that people either hate it or love it, but if one gives nature a chance to open up the door, the tropics—and Sumatra—can prove a tremendously rewarding experience.

—The End.

1 Mastering blueprints is one of the skills taught young Kuwaitis in Kuwait Oil Company's training school. The school prepares youths for important jobs in the company's operations.

Point IV Program . . . The Private Capital Way

Kuwait Oil Company's education program is another example of how foreign aid can work two ways for the betterment of all.

DESPITE RAPID improvements in public education made by the Government of Kuwait with 18 new schools in operation and a total enrollment of more than 8000, Kuwait Oil Company has established its own training school to prepare young Kuwaitis for more important positions in the company's operations.

Kuwait Oil presently employs some 7000 of which 57 percent are Kuwaitis and other Arabs. The company's aim is to employ as many nationals as possible and to prepare them in industrial techniques the training school was established at Magwa. Young Kuwaitis, 15 to 25 years of age, normally are eligible for admission, but older men may be enrolled if it is believed there is a reasonable chance they can obtain the required standard of skills.

All trainees spend their first three months in preliminary classes, where the day is equally divided between basic education in school and practical work in the shop. Basic education is confined to simple arithmetic and learning English words and terms used in connection with the trades they will ultimately undertake. While practical work in the shop is mainly occupational, it is here that the aptitudes and temperaments of the trainees are assessed.

Just before completing the basic course, each trainee is interviewed to determine his ultimate trade. The advanced courses presently being taught at the training center are carpentry, painting, electrical installation, pipe fitting and plumbing, diesel and vehicle fitting, machine operating, welding, sheet metal working, mobile plant operating and driving.

The courses vary in length, depending upon the complexity of the trade being learned, but most of them are for 24 months. Trainees are grouped in classes of between 10 and 16, again depending on trade, under skilled instructors who have had considerable industrial experience. Outlines of the various courses call for practical work or exercises, interspersed daily with short, informal discussions on the shop floor. Formal lectures on theoretical principles are also given, their frequency depending on the nature of the craft.

Beginners are started on simple operations, using training materials, but as their skills develop, actual production work for the company is undertaken. All trainees are paid during the training period. At prescribed intervals, tests are given and wage increases, based on the results of the tests as well as on general behavior, are awarded.

The speed with which the Kuwaiti acquires industrial techniques and skills—be he a townsman or Bedouin from the desert—is remarkable. Kuwait Oil officials say there is no doubt that in the course of time many of the trainees will qualify for more advanced training in the various branches of engineering.

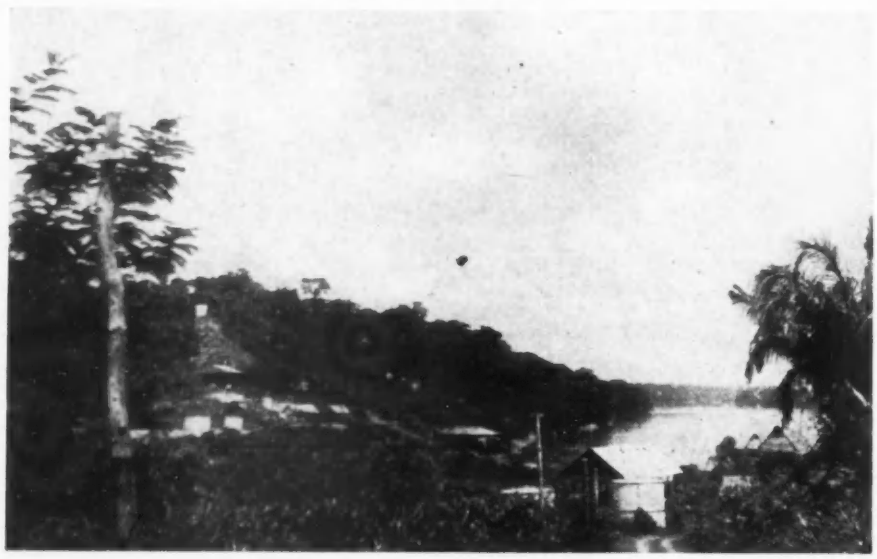
2 Kuwait Oil Company's school has 63 teachers and students such as these, who are studying basic principles of electrical maintenance. Day is divided between academic and shop work.

3 These trainees are gaining practical experience in engine maintenance. Full training courses vary in length depending on the complexity of the trade. Most last 24 months.

4 Shop training starts with use of basic tools employed for accurate measurements. Kuwait Oil Company hires as many young Kuwaitis as possible and many promise to develop into engineers.

5 The students are provided their mid-day meal at the Training Center Canteen. Trainees, who are paid during the training period, also participate in an organized sports program.

COLLECTING HEADER in the foreground and administration buildings are situated atop the Ganso Anzul dome.



AGUAS CALIENTES PORT on Pachitea river, site of a Compania de Petroleo Ganso Azul, Ltd., refinery.

Nature Makes It Tough

Eastern Peru's Montaña has a lot of oil . . . but the Amazon basin is hemmed in by the Andes and jungle.

By DR. J. E. RASSMUSS, Petroleum Consultant, Lima, Peru

EASTERN PERU'S upper Amazon basin, the Montaña, constitutes one of the biggest undeveloped prospective areas in South America. The Montaña, which means forested country, comprises about half of Peru in an extension of around 230,000 square miles.

Separated from the Pacific by the high Andes, which are crossed by only one highway, 530 miles long, from Lima to the Ucayali river Port Pucallpa, the basin's only outlet is the Amazon river to the Atlantic. But the distance from Iquitos, principal city and capital of Loreto Department with about 50,000 inhabitants, to Pará in Brazil, on the mouth of the Amazon river, is 2070 nautical miles.

However, navigable rivers facilitate travel far into the interior, which is covered with tropical forests. Regular airlines from Lima to Iquitos, to Pucallpa and to Iberia in the south, in Madre de Dios, allow fast transportation for passengers and light cargo to the coast.

To accelerate oil development in this area, the government has offered attractive conditions under the new oil law.

- Overall income tax is reduced to 10 percent for the first ten years of exploitation.
- Income tax advance on exported oil is set at 3 percent for the same period.
- Surface rentals are 25 percent of the charge on the coast.
- Depletion allowance of 27.5 percent is allowed.
- Exploration terms are fixed at ten years maximum and exploitation at 50 years, with extensions to 75 years.
- Extension of the exploration concessions may reach 2.47 million acres, of which 50 percent revert to the state.

Ganso Azul is the only producing field in the Montaña. The domelike structure was recognized from the air by R. M. Moran during a survey for a railway to the Amazon. The Selden Breck Construction Company of St. Louis, Missouri, financed the detailed geological survey, carried out by Moran and Douglas Fyfe, and obtained the first concessions, which were transferred later to a California group, Ganso Azul, Inc.

This company was transformed in 1938 in a Peruvian company, headquartered in Lima under the name of Compaña de Petróleo Ganso Azul, Ltda., which is the actual owner of the concessions. Oil was discovered by the first well, spudded on July 4, 1938, and completed in February, 1939.

Ganso Azul field is situated at 8°49′ S and 74°41′ W on the western side of the Pachitea river, an affluent of the Ucayali, which together with the Marañon forms the Amazon river. Distance in a straight line from its river port, Aguas Calientes, to the mouth of the Pachitea is only about 12 miles. But the distance on the river because of many curves is more than double.

River transport for barges to Pucallpa, starting point of the highway to Lima, requires 12 hours downstream, 24 hours upstream. By airplane, it takes two hours from Lima

Picture of a man using

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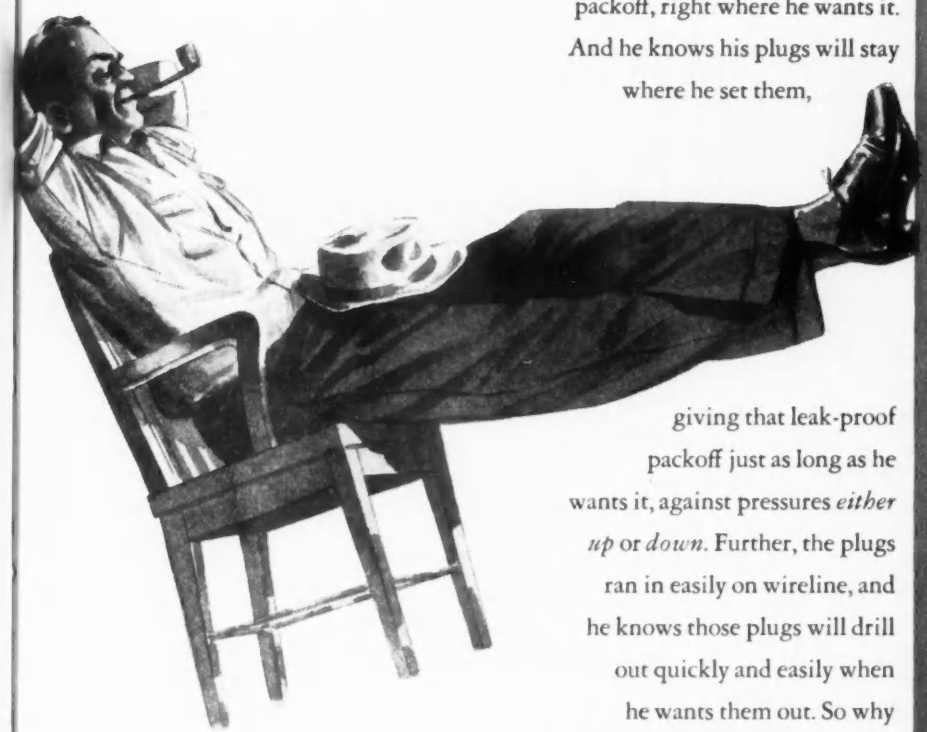
Wireline - Drillable

BRIDGING PLUGS

Comfortable as a clam at high tide, because he hasn't a worry in the world as far as plugs are concerned. He *knows* he has leak-proof packoff, right where he wants it. And he knows his plugs will stay where he set them,



giving that leak-proof packoff just as long as he wants it, against pressures *either up* or *down*. Further, the plugs ran in easily on wireline, and he knows those plugs will drill out quickly and easily when he wants them out. So why shouldn't he be cheerful!

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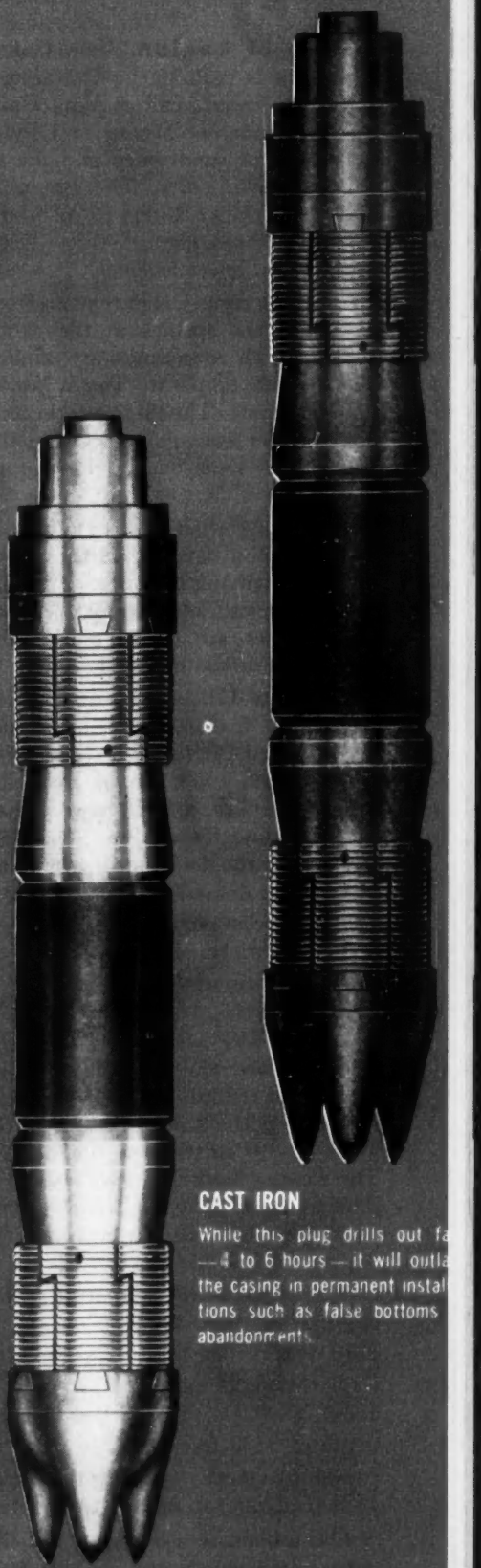

CAST IRON

While this plug drills out fa —4 to 6 hours— it will outla the casing in permanent instal tions such as false bottoms abandonments.

MAGNESIUM

The plug to use when fastest possible drillout is of first im portance. Drills out in 1 to 3 hours. Rated for pressures up to 6,000 p.s.i.

to Pucallpa and 20 minutes more to reach the landing field of Ganso Azul.

Geology of Region. The Ganso Azul dome is built up by Cretaceous beds. The lowest, called Agua Caliente formation by Moran and Fyfe, is a group of sandstones of light to reddish brown color. The group is 5000 feet thick. Intervals of dark and bluish shales about 500 feet thick are found in lower levels.

The name Agua Caliente stems from the many hot springs in the sandstones, which sometimes are almost boiling and evaporate steam as in Shapaya creek. This high geothermic degree is yet unexplained. Oil in the Ganso Azul wells has a temperature of 180° F.

Alternating shales indicate a marine ingression in which, farther north in the Contamaña region, rare marine fossils of Aptian age have been found. These shales are considered as the source bed of the oil.

The Auga Caliente sandstones are covered by marine shales and limestones, called Chonta formation, with a rich fauna of Senonian age. The uppermost member, the white "Sugar" sandstones about 500 feet thick, form the dark rim surrounding Ganso Azul dome in air photographs. They are covered by Tertiary Red Beds. A variety of names has been given the formations later on.

On the crest of the dome, which is 1500-1600 feet above sea level and 600 feet above the river, outcropping yellow and reddish sandstones lie flat. Dipping on the flanks increases from 5° to 25-30° on the exterior border. The eastern flank is cut by a vertical fault at Aguas Calientes on the river, where the red beds outcrop in vertical position.

Nine wells have been drilled, the last one in 1946. The first, begun in 1938, was drilled by the Drilling and Exploration Company at a cost of about $300,000. It reached a total depth of 3130 feet. At 1146 feet, the coarse oil sand was struck and at 1174 feet, the top of the ashbed met.

The ashbed is a greenish tuff-like strata, underlying the principal oil sand. It is impermeable and, therefore carefully observed during drilling.

At 1457 feet the lower limit of the Cretaceous sandstones was reached and, from there to the final depth of

SITE OF GANSO AZUL

3130 feet, the hole remained in Permian limestones. No unconformity was observed in the hole between the two formations, although it certainly exists and is observed elsewhere. The well reportedly produced 650 barrels on test. It was flooded by water from below the ashbed, and abandoned. Twenty-five feet to the south, the second well 1a was drilled to 1176 feet to the ashbed. It produced 600 barrels a day of 43 gravity oil on its initial test.

Well 2, 2000 feet northwest and 1270 feet deep, was flooded by hot water, which rose to within 330 feet of the surface. Some oil shows were found.

Well 3, to the southeast, was drilled to 1139 feet without reaching the principal oil sand. The test yielded 200 barrels a day, but in 1945-46 the hole was filled with gasoline because of lack of storage.

Well 6, to the northeast, is 1178 feet deep. Apparently, the oil sand was cemented off and only hot water with a small quantity of oil was produced. But it is in a lower structural position and thickness of the oilbearing series is reduced.

The biggest wells have been to the south and southwest of Well 1.

• Well 5 is 1128 feet deep. The oil sands and silts are 176 feet thick. The test produced 2800 barrels a day.

• Well 8, to the southwest, is only 918 feet deep. It initially produced 1400 barrels a day. Pressure was 105 pounds.

• Well 7, to the south, is 1019 feet deep. Total thickness of the oil sands and silts is 166 feet, and the most productive coarse sands reach a thickness of 45 feet. The test yielded 3700 barrels a day of 44 gravity oil. The biggest wells are on the highest elevation of the structure, which is somewhat different from the surface structures, as exposed by the outcropping sandstones.

Since December, 1946, no new wells have been drilled because there has been no outlet for the oil. Total maximum capacity of the six producing wells is about 9000 barrels a day. All wells are flowing by water drive from a water table in the Shira mountains. The pipe lines from producing wells are connected with the collecting header on the top of the dome, which is opened only to release the required quantity for the refinery.

The crude flows by gravity through a pipe line to the refinery at Aguas Calientes, on the Pachitea river. Distance in a straight line is a little more than two miles; the road is about three miles long.

Production. Ganso Azul output from the beginning in 1939 has been as follows:

Year	Barrels
1939	10,250
1940	4,480
1941	13,750
1942	27,300
1943	29,592
1944	45,534
1945	65,259
1946	89,236
1947	118,001
1948	120,810
1949	140,196
1950	149,463
1951	168,656
1952	200,045
Total	1,182,572

Production was highest at the beginning of 1952—about 20,000 barrels in January—but declined to about 11,000 in October according to local requirements.

At Aguas Calientes, the river port, the crude is refined at a topping plant of about 700 barrels a day capacity. Gasoline, kerosine, diesel and residual oils are recovered. By adding lead, 70-octane gasoline is obtained.

The products are shipped by barge to

Pucallpa, Aguaytia and Iquitos, where storage tanks have been erected.

To smaller places, products are shipped in drums. Residual oil is used by the electric plant in Iquitos. Total consumption of Peru's Department of Loreto can be estimated at only about 100,000 barrels annually. Neighboring markets in Brazil are also served occasionally, and 23,000 barrels was shipped in 1952 to Manaos.

Principal difficulty in shipping is the low water in Pachitea river during the dry season. Depth at Aguas Calientes reaches 12-14 feet, but a sand bar about half way to Pucallpa has only a two to three-foot depth in the dry season.

At Pucallpa the Ucayali river is 20 feet deep. It is, therefore, planned to lay a pipe line the 48 miles to Pucallpa to transport 3000 barrels a day, to which Ganso Azul's output could be easily raised.

Ganso Azul is a rich field with its 43-44 gravity flowing crude. Proven reserves can be estimated at 20 million barrels, but may be substantially increased by the oil to the south and the yet untested second structure on Chonta Island. The lower oil sands have yet to be tested. Ganso Azul's exploitation concessions comprise 74,-100 acres.

Royalty, under the old law, amounts to only 2 percent for the first 15 years of exploitation and 4 percent for the following ten years. An export tax is assessed of 50 cents per metric ton for the first term of 15 years, rising to 75 cents for the next ten years. About 250,000 acres more have been applied for exploration under the new law on October 28. But a thorough development of this field has been handicapped by lack of transport facilities and an appropriate market. A pipe line from the Amazon basin to the Pacific Ocean could be economically built only when a production of at least 100,000 barrels a day is assured in eastern Peru.

Pipe Line Planned. A 350-mile pipe line is projected from the port of Bayovar on the Sechura coast to Olmos and over the 7000-foot Porculla pass, the only low gap in the Andes, thence to Puerto Melendez (Borja) on the Marañon river. Connecting that terminal with Ganso Azul would require another pipe line of 500 miles in length. Farther south, the passage over the Andes is impossible because altitude at the lowest points is almost 14,000 feet.

Ganso Azul's oil can be shipped only to the east to Brazil, where the oil prices are high and consumption is increasing rapidly. In Manaos, 1157 nautical miles away, a new 5000 barrel-a-day refinery is projected and approved by the Brazilian government.

River transport on the Amazon should be as economical as on the Mississippi in the U. S. or the Danube in Europe, where oil was shipped before the war from Roumania to Germany in barges for a distance of more than 1000 miles. The new 3000-horsepower towboats, such as those of Sinclair Refining Company, require only a 7½-foot draft and can handle tows upstream of 120,000 barrels. In the U. S. generally, tugs of 2000 horsepower are used on rivers to tow 12 barges of 9000 barrels each—a total of 108,000 barrels.

The market of Manaos, where some oil is shipped, should be especially economically accessible for river transport. When new oilfields are developed on the Ucayali river, as in the Pisqui region about 60 miles north-northwest of Ganso Azul, where Oriente has drilled two exploration wells, river transport to Brazil would be the natural outlet.

Another market for Ganso Azul could be considered for the future. A standard gauge railway from Tambo de Sol, near Cerro de Pasco, to Pucallpa on the Ucayali is projected by the Peruvian government. About 30 miles of rail has been laid. Transport by tank cars on this railway to the central mining region of Peru, at Cerro de Pasco, should be possible in order to supply the increasing consumption of this industrial region.

By recently completed negotiations the Ganso Azul field has been acquired by the Texas Gulf Producing Company of Houston at a price of around $4 million, paying $1 million cash. A new Ganso Azul Co. has been formed, in which Texas Gulf owns about 80 percent of the stock, and Kendall Refining Co. of Bradford, Pa., and Bay Refining Corp. of Saginaw, Michigan, with a 10 percent interest each.

The new company proposes to drill eight new wells, to construct the 48 miles of pipe line to Pucallpa and improve shipping facilities for increased exports of crude to Brazil. Some crude will be treated also in the U. S. refineries of the group. The first rig has already arrived on the field from Houston to resume drilling, interrupted since 1946.

GEOLOGICAL REFERENCES

R. M. Moran and D. Fyfe, Geologia de la region del Bajo Pachitea. Bol. Dir. Minas, Lima, 1933.

M. L. Thompson, Permian fusulinid from Peru, Journ. Paleont. 17, 1943.

A. Heim, Croquis tectonico del camp petrol.Ganso Azul, Bol. Dir. Minas, 79, Lima, 1947.

B. Kummel, Geological reconnaissance of the Contamaña region, Peru. Bull. Geol. Soc. of America, Vol. 59, 1948.

J. E. Rassmuss, Problemas del Petroleo del Peru, Bol. Soc. Geol. Peru, Lima, 1949.

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References to new concessions sought by interested companies in Peru which appeared on Page 277, April issue, in the article "Peru Perks Up" should have read "Ganso Azul has asked for about 250,000 acres of new concessions in various parts of the Montaña from Pachitea to Iquitos, shoving total acreage requested by companies up to around three million acres."

(In the meantime, this figure has been increased by applications of the Texas Petroleum Company and Socony-Vacuum Company.)

In the second installment of this article, entitled "There's Oil in Peru's Montana," May issue, reference to Compania Petrolera Lobitos increasing its own production to about 10,-000 barrels a day related to holdings in the coastal area.

In northern El Alto field, from which a substantial share of Peru's production is obtained, crude is produced primarily from shallow wells in Upper Eocene sands. An operating agreement was entered into recently under which International Petroleum Company will develop an intermediary area on the high marine Quaternary terrace. About 7000 barrels of crude have been produced.

Zorritos and Organos concessions, Empresa Petrolera Fiscal's only producing fields, were purchased from the former Piaggio interests. Drilling was begun in 1865 at Zorritos field, one of the world's oldest oil fields. It now is almost depleted, yielding about 50 barrels daily from 35 wells. Three deep exploration tests, drilled during the past few years by Dunlap & Graham, Inc., of Long Beach, Calif., were failures.

And in the same article reference to secondary recovery methods related to International Petroleum Company's La Brea-Parinas field.—**The End**

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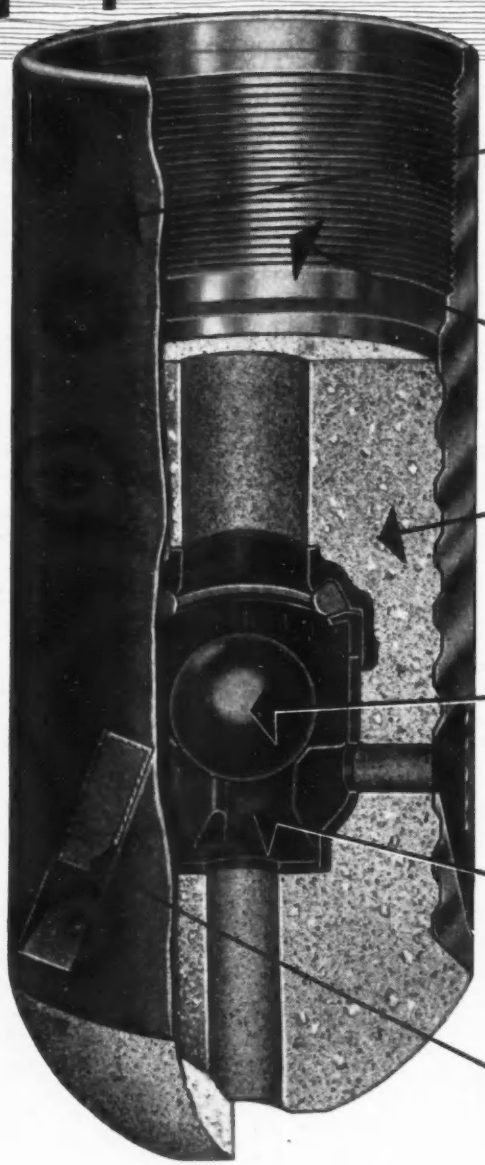
Everything points to BAKER Cement Wash-Down Whirler Float Shoe

PRODUCT NO. 120

as being outstandingly the BEST



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in which a strong concrete plug and plastic valve assembly are securely anchored

ACCURATELY CUT THREADS
to fit any style casing

BAKER-FORMULA CONCRETE
and granular plastic —easily drillable

PLASTIC BALL VALVE
to seal instantly against a resilient valve seat

AMPLE CIRCULATION PASSAGEWAYS
for hole conditioning and cementing

WASH-DOWN WHIRLER PORTS
whirl the cement slurry and provide uniform encasement of the casing with cement

The story of BAKER SUPERIORITY began 27 years ago, and continues through the years with one improvement after another. Baker pioneered in using friable (easily drillable) materials for the internal construction of shoes and collars; pioneered in using phenolics (plastics) for the construction of the valve assembly. And, with experience over a 27-year period, Baker naturally possesses a superior knowledge of design, construction and operation of cementing equipment, and how such equipment should be used to secure successful, "first-time" cementing results.

Proof that the Baker Cement Wash-Down Whirler Float Shoe (Product No. 120) is "BEST" is evident from thousands of perfect cementing jobs—under every type of field condition. You can easily secure additional proof on your next job.

There are dozens of products in the complete Baker line, ready whenever and wherever you need them—and remember also that Baker Service Engineers are available everywhere to recommend the proper combination to make your *every* job successful. The typical combination illustrated and described on the opposite page, solves many cementing problems—and may be ideal for your next job.

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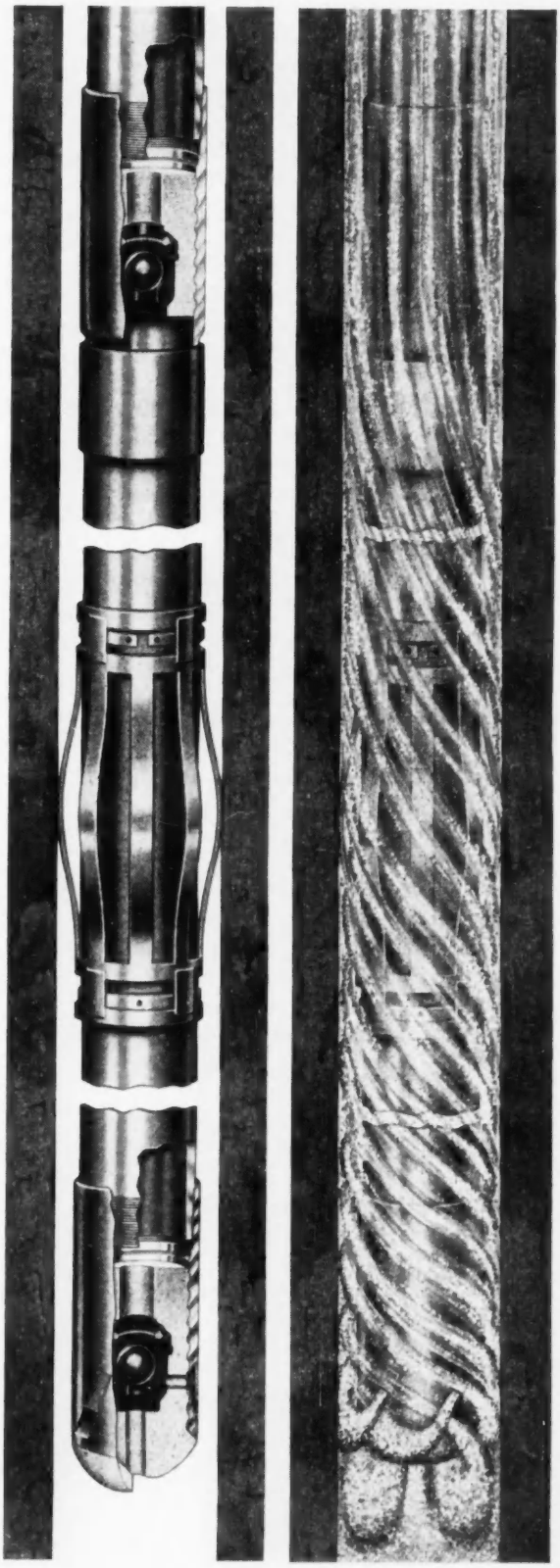
THE DOWNWARD HYDRAULICKING ACTION of the fluid through the baffled, side down-whirler ports of a Baker Whirler Shoe, and through the nozzle-like bottom outlet, effectively removes bridges and permits safe running of the casing.

When washing the formation at the cementing point to condition the hole, the "whirling" motion of the fluid helps remove mud cake from the side walls. This *downward* whirling is far superior to any *side* jetting action.



The view at far right shows the "whirling" motion given to the cement slurry as it is discharged from a Baker Cement Wash-Down WHIRLER Float Shoe, with the shoe joint centered by means of a Baker Model "G" Casing Centralizer. *This same whirling motion given to the circulating fluid, conditions and prepares the wall of the hole immediately prior to the discharge of the slurry.* The whirling action of the slurry, in turn, not only supplements the hole conditioning process, but also ensures that the centered casing will be completely encased with a uniform body of cement and that the hazard of channeling will be reduced to a minimum.

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KEY TO CEMENTING SUCCESS

a WORLD of OIL

By **DON KLIEWER,** WORLD OIL Staff

Sicily: D'Arcy Exploration Company, prospecting subsidiary of Anglo-Iranian Oil Company, will drill a test well in the Vittoria area. Contractors are scheduled to begin drilling with a rig capable of reaching 10,000 feet . . . Since June, 1951, when D'Arcy was given permits to search for and produce oil around Ravanusa, Vittoria and Priolo in the south and east sections of the country, geological, gravity and seismic surveys have been made.

Egypt: Southern California Petroleum Corporation is getting under way with its Middle East program. More than 100 Egyptians are working at the main camp at El Shatt unitizing equipment. A working camp at Wadi Feiran, about 100 miles south of El Shatt camp, will be constructed, and geophysical records are under study.

England: D'Arcy Exploration Company has stopped drilling on the Isle of Wight, off the south coast, after reaching 5161 feet at Arreton.

France: Consumption of petroleum products has risen, during the past 15 years, from about 51 million barrels to almost 133 million barrels a year.

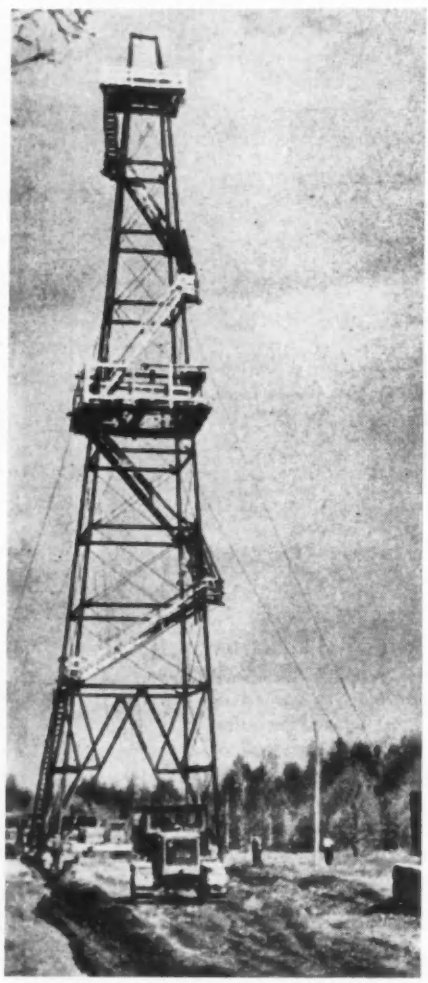
Albania: A trade agreement was signed with the USSR on April 8 at Moscow, calling for an increased exchange of goods. Under the pact, Russia will export oil machinery in return for Albanian crude.

Hungary: Considerable difficulty is reported at Lovaszi oil field, where small diameter crude pipe lines require almost continuous cleaning because of paraffin clogging. . . Planned crude production for 1955 is 4,578,000 barrels.

Poland: Crude output of 2,225,700 barrels has been scheduled for 1955.

Roumania: Recruiting of students for the three oil engineers' schools is slowing down. Despite widespread propaganda urging enrollment, all schools report small classes . . . The shortage of pipe is being alleviated to some degree through a circuitous purchase route—it is reported that West Germany sold one shipment to France; the pipe went from there to Switzerland, where it was sold to some obscure Austrian sources from whom the Roumanian trade mission bought directly. The extensive travel of the undisclosed amount of pipe added a reported $350,000 to the purchase price.

Yugoslavia: After three years of exploring, an economically explorable oil deposit has reportedly been discovered near Jermenovice (Wojwodina). The site is near the Hungarian border beyond which the Zala area produces a major portion of Hungary's annual crude output.



RUSSIAN OIL WORKERS in the Bashkir Autonomous Republic, which includes part of the Soviet Union's Second Baku region, use tractors to move this drilling rig to new location.

Russia: An offer reportedly has been made to the Japanese government to sell Russian crude products up to 5 percent below the world market level . . . This offer apparently came at the peak of the Iranian dispute.

Germany: The successful well Boerger 2, in the Weser-Ems area and owned by the joint interest group C. Deilmann-Gewerkschaft Elwerath, has been named Ostenwalde 1. Situated several hundred feet from thee Ostenwalde rail station, the well is pumping about 30 barrels of crude daily from the Wealden . . . A second well, Ostenwalde 2, was drilled about half a mile south of Ostenwalde 1, and is expected to be on production soon . . . In Wintershall AG's newly-discovered Aldorf oil field, southwest of Bremen, all seven deep wells are producing . . . The 20-mile pipe line built by Duisburg-Ruhrorter Haefen AG. connecting Duisburg-Ruhrort harbor with the Scholven-Chemie AG hydrogenation plant at Gelsenkirchen-Buer has been opened . . . A second well, Dea-Pfungstadt 3, has been brought in as a gas well in the new Pfungstadt field on the Upper Rhine. Production is at a rate of about 53 Mcf. per hour.

Canada: Since the British government has eased restrictions on foreign capital investment, indications are that British interests will increase their activities in Canada . . . Oil production in Saskatchewan rose to 220,459 barrels in February, an increase of 45,590 barrels from the previous month . . . Markets for western crude can easily reach 400,000 barrels daily —about double current production— which could give wesetern wells a production capacity in excess of present maximum efficient rate . . . Williams Brothers Pipe Line Contracting Company of Toronto has been awarded a contract to build the Sun Oil Company's $1 million, 200-mile, eight-inch, 13,000-barrel-a-day pipe line from Sarnia to Toronto . . . Royal Dutch-Shell Group has formed a new wholly-owned subsidiary in Canada called Canadian Shell Limited, which has authorized capital of $200 million.

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WE BRING over 150,000 miles of Shoran-guided survey experience to your exploration planning. Since 1947, when AERO pioneered the first high-sensitivity airborne magnetometer survey over water, we have mapped extensively in the United States, Canada, South America and Africa.

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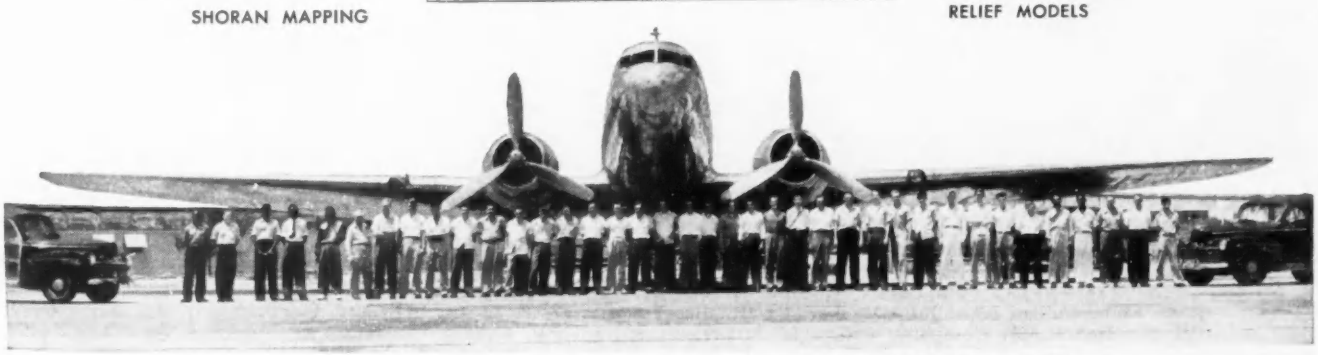


Part of the staff for the Shoran-guided airborne magnetometer survey of the 85,000 sq. mi. Bahamas area.

What's Happening

AMONG WORLD OIL MEN

THESE EXECUTIVES addressed the recent semi-annual coordination conference of the producing, refining and marine divisions of Creole Petroleum Corporation at Maracaibo, Venezuela. Left to right, are J. J. Horigan, president of Lago Oil & Transport Company, Ltd.; R. W. Miller, vice president of Creole, and A. T. Proudfit, president of Creole.

FOREIGN VISITORS ATTENDING a recent Houston Nomads' chapter meeting were G. L. Von Hillo, Shell C. P. C., Maracaibo, Venezuela; Fred W. Haeseker, Asiatic Petroleum Corp., Houston; and Col. Kirk P. Brock, U. S. Army, Europe.

INTERNATIONAL GUESTS at a recent meeting of the Los Angeles Chapter of Nomads, were left to right, standing, B. de Beaumarchais of S. N. Repal, Algiers; Milton H. Hobbs, Standard Vacuum Oil Company, Sumatra; V. C. Dabbs of Mene Grande Oil Company, Venezuela; Thomas D. Foster, Standard Vacuum Oil Company, Sumatra; J. C. Bazinet, Arabian American Oil Company, Saudi Arabia; L. Hahn, Wintershall, Germany; E. C. Mahmoodian, Iran; Josip Vuckovic, Naftaplin, Yugoslavia. Seated are Jum Worsdall, National Supply Company, Venezuela; F. Leca of S. N. Repal, Algiers; R. Samizadeh, Iran; Robert S. Hall, Petro-Tech, Venezuela; Bob Grebe, Baker Oil Tools, Venezuela; I. Eklund, Juhansson y Cia., Bolivia; and H. Haydarpoor, Iran.

BRYAN DENSON, division engineer of Union Oil Company of California at Midland, Texas, has resigned to become general superintendent for American Independent Oil Company in the Neutral Zone between Kuwait and Saudi Arabia, with headquarters at Kuwait.

Bryan Denson

Denson was graduated from the University of Texas, Austin, in 1941 with a BS degree in petroleum engineering. After graduation, he joined Magnolia Petroleum Company at Kermit, Texas, as petroleum engineer, and later took the same post with George P. Livermore at Lubbock, Texas. In 1945, he went to Saudi Arabia as resident engineer for Arabian American Oil Company, with headquarters at Abqaiq. Returning to the U. S. in 1947, he joined Drilling and Exploration Company at Bakersfield, Calif. In 1948, he became petroleum engineer at Midland for Union Oil Company. Three years later, he became division engineer.

•

The Prime Minister and Viceroy of Yemen, PRINCE SAIF EL ISLAM AL HASSAN, recently visited Hanover and Hamburg, Germany, to learn the methods and progress of crude production in Germany. At Hanover he visited with Dr. W. Schott of the German Geological Survey. Dr. Schott visited in Yemen late last year.

•

E. H. TANNER, president of Triad Oil Company, of Calgary, Alberta, was elected a director of Royalite Oil Company at the company's annual general meeting of shareholders in Calgary. Active in financial and oil circles in Western Canada for many years, he is a director of the Toronto General Trusts Corporation. C. U. Daniels, president and managing director of Royalite, was reelected.

Improved Water Coolers

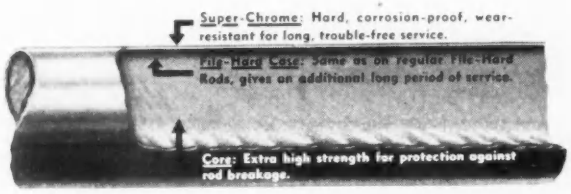
The tops of all Igloo water cans and coolers undergo a new forming process, done under 40 tons of hydraulic pressure, to provide four thicknesses of metal at this joint and make the top leakproof. It also adds strength to keep the top opening perfectly round despite rough handling. The forming is done with precision that makes possible interchanging the lids. Manufactured by Bettis Corporation, Igloo now makes a two-gallon cooler in both standard and insulated types. On special order, insulated cans and coolers in all sizes can be furnished with stainless steel inner liners for use where the utmost in sanitation is desired. All Igloo cans and coolers have double-locked seams make leakproof through die forming processes that completely eliminate soldering or welding.

This item supplements Bettis Corporation data on pages 692-701 of Composite Catalog, 19th Edition.

Circle No. 6 on Postcard

Piston Rod

Mission Manufacturing Company has announced a change in the name of its chromium plated piston rod from "Super-Surfaced" to "Super-Chrome." The company decided on the change due to the similarity of Super-Surfaced and Super-Service, a trade name used on other Mission products such as mud pump valves and mud pump liners. Also the named Super-Surfaced failed to indicate that the piston rod is actually chromium plated. The Mission Super-Chrome rod lasts up to four times longer than ordinary rods under corrosive conditions. Pitting and grooving are reduced to a minimum and Mission Super-Chrome rods stay smooth even when salt or brackish wash water is used.


Super-Chrome: Hard, corrosion-proof, wear-resistant for long, trouble-free service.
File-Hard Case: Same as on regular File-Hard Rods, gives an additional long period of service.
Core: Extra high strength for protection against rod breakage.

This item supplements Mission Manufacturing Co. data on pages 3437-3524 of Composite Catalog, 19th Edition.

Circle No. 7 on Postcard

Hydraulic Jack

A new 35-ton hydraulic jack is now in production by Duff-Norton Manufacturing Company. Among the features of this greater capacity hydraulic jack is the patented automatic air vent which eliminates 90 percent of "air lock" difficulty. The new jack weighs only 55 pounds, is 25 percent lighter in weight than other types with the same capacity, caused by the patented vent design which permits using smaller reservoir thus making possible smaller, lighter base. In the new jack the air vent screw and adjustments are eliminated and with no air vent set screw to open or close during jack operation, the usual fluid leaking point is eliminated. The single pump with longer stroke gives more rapid lift with less pumping motion and fewer moving parts mean less wear.

This item supplements Duff-Norton Manufacturing Co. data on page 1440 of Composite Catalog, 19th Edition.

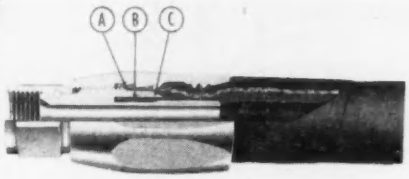
Circle No. 8 on Postcard

Slip Type Clutches

A new line of adjustable torque-limiting clutches providing overhead protection for machine drives in a wide variety of equipment is announced by Morse Chain Company. These compact slip-type friction clutches act as automatic shear pin mechanisms and avoid the time and labor required to insert new shear pins. Particularly adapted to roller chain drives, these are designed to be used in connection with standard Morse Type A plain plate roller chain sprockets. Other types of rotating members such as gears, pulleys and sheaves can be used with the new clutches. Morse standard torque-limiting clutches are ideally adapted as overload protection devices in the power drives of many types of industrial machinery including conveyors, materials handling equipment and devices, agricultural equipment, packaging machinery and other related types of equipment where the torque capacity of the drive does not exceed 260 foot-pounds.

This item supplements Morse Chain Company data on pages 3574-3579 of Composite Catalog, 19th Edition.

Circle No. 9 on Postcard



Steam Hose Line

The Aeroquip steam hose is constructed of a natural rubber inner tube reinforced with either one or two plies of high tensile steel wire braid, depending on the hose size. An asbestos braid is applied over the wire braid reinforcement. The outer cover consists of an oil resistant butyl rubber cover. A feature of the Aeroquip steam hose line is the new "Little Gem" fitting. This fitting is attached like other Aeroquip detachable reusable fittings: the socket is screwed on the hose end counterclockwise, the nipple assembly is inserted into the socket and hose I.D. and assembly completed by screwing the nipple in clockwise. Once attached, the fitting needs no further adjustment.

This item supplements Aeroquip data on pages 164-165 of Composite Catalog, 19th Edition.

Circle No. 10 on Postcard

Portable Indicating Instruments

Two series of improved portable electric instruments designed for maximum convenience and readability have been announced by the General Electric Company's Meter and Instrument department. The new instrument, Type DP-11 and DP-12 are available to indicate volts, watts, amps and milliamps. The DP-11 was designed for general testing for electrical maintenance men who need a rugged, easily-read indicating instrument with an accuracy of one-half of 1 percent of full scale. The DP-12 is a high precision testing instrument designed for laboratory, field and production use. Accurate to one-fourth of 1 percent of full scale, this instrument is particularly suited to the maintenance of portable or switchboard instruments, control panels, and numerous production devices.

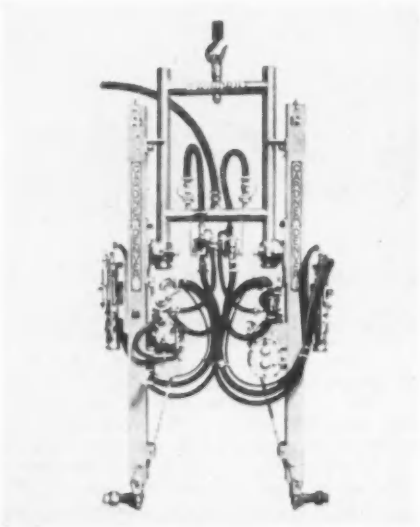
This item supplements General Electric Company, Apparatus Sales Division, data on pages 1949-1968 of Composite Catalog, 19th Edition.

Circle No. 11 on Postcard

Save time! Keep informed! Circle numbers on postcard, page 281

New Equipment

SUPPLEMENTING COMPOSITE CATALOG



Pipeliner's Rock Drill

The Gardner-Denver Twindril, the pipeliner's rock drill which is used wherever rock is encountered along the trench line, now has a new feature which makes it more convenient to use. Gardner-Denver engineers converted the hollow tubular framework into a compressed air head and have eliminated one of the main air hose connections. The Twindril is a complete rock drilling unit which is quickly hung from the side boom of the pipe line tractor and is powered by compressed air from a portable air compressor which is towed along behind the tractor. Formerly two separate air hoses were required from the air receiver, one going to each drill; now only one air connection between the receiver and air header is required.

This item supplements Gardner-Denver Company data on pages 1849-1858 of Composite Catalog, 19th Edition.

Circle No. 1 on Postcard

Bullet Perforators

An improved line of McCullough burrless bullet perforators has been announced recently by McCullough Tool Company. Designated as M-3, these perforators have improved high temperature powder, improved density of the powder and improved bullet penetrating properties. These changes result in a 25 percent increase in penetration over former bullet type perforating equipment.

This item supplements McCullough Tool Company data on pages 3261-3300 of Composite Catalog, 19th Edition.

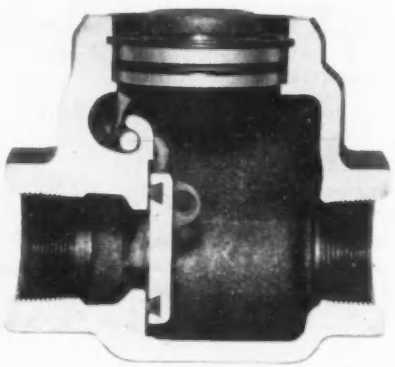
Circle No. 2 on Postcard

Rotary Drive Units

The Brewster independent rotary drive units available in both an 18-inch table opening with a 200-horsepower engine and a 22-inch table opening with 300-horsepower engine utilize a torque converter on an engine driving a GM torquematic transmission which has three speeds forward and one reverse. The RSH-18 and RSH-22 are of new design with full oil bath on the gears and a separate oil system for the main bearing to insure a constant flow of clean oil on the precision-finished bearing parts. The rotaries have angular contact type ball holddown bearings for frictionless rotation and holding of the gears in proper mesh for longer life of the spiral bevel gears. The gear compartment is designed with a Brewster triple seal to keep mud out of the gear oil. The pinion shaft bearing and holddown bearing are greased to assure most efficient lubrication. The pinion shaft is of alloy heat treated steel for strength and wear resistance.

This item supplements The Brewster Co., Inc., data on pages 941-976 of Composite Catalog, 19th Edition.

Circle No. 3 on Postcard



Swing Check Valve

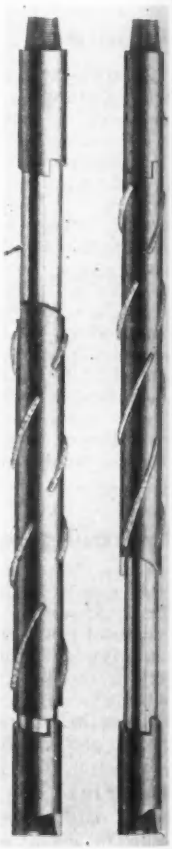
A new line of improved swing check valves has been developed by the Charles Wheatley Company in collaboration with the Frank Wheatley Pump and Valve Company. The new streamflow synthetic seal check valve which weighs 50 percent less than the best standard check valve is full pipe opening allowing ample scraper room. The O-ring sealed bonnet is secured by a snap ring instead of a heavy and slow flange. There is no pin through the body for the clapper linkage, eliminating possible leakage. Removing the bonnet automatically releases the clapper for quick inspection and the seal gives a positive seal on only one pound pressure differential.

This item supplements Frank Wheatley Pump and Valve Company data on pages 5137-5140 of Composite Catalog, 19th Edition.

Circle No. 4 on Postcard

Combination Jar and Keyseat Reamer

The Homco combination jar and keyseat reamer, designed and manufactured by Homco primarily for use in directional drilling, consists of two parts, the mandrel with a box end up and pin end down and a sleeve with hard-faced reaming blades. The sleeve is free moving, independent of the mandrel. This equipment is run just above the drill collars and connects to the drilling string. As drilling continues, sometimes the tool joints of drill stem, being larger O.D. than the pipe itself, bite into the wall of the bore hole and eventually a keyseat is established. This usually is discovered when coming out of the hole and, unknown to the drilling crew, when the drill collars, being of a larger O.D. than the tool joints, enter the keyseat, become wedged in and cannot be raised or lowered, constituting a stuck string. If this jar and reamer is used, instead of the drill collar wedging, the reamer wedges itself into the keyseat and the driller can lower the working string and rotate to the right. Through a series of operations in the drilling process, the combination jar and keyseat reamer enlarges the hole to a point where the drill collars can easily pass through.



This item supplements Houston Oil Field Material Co., Inc. data on pages 2417-2448 of Composite Catalog, 19th Edition.

Circle No. 5 on Postcard

Save time! Keep informed! Circle numbers on postcard, page 281

Other New Equipment

Treater Valve

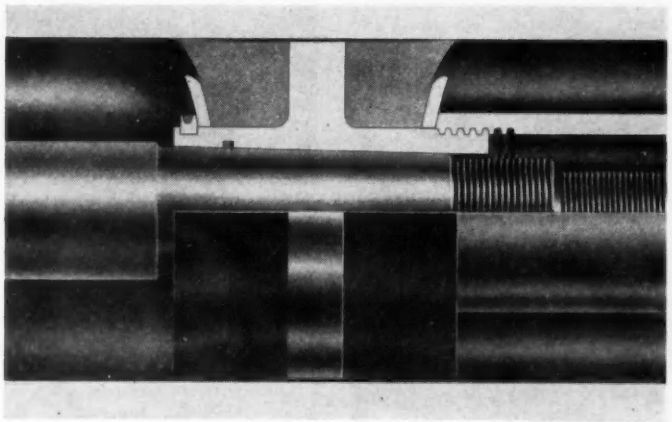
Kimray Inc. has manufactured a treater valve which is rugged and designed for rough oil field use. Designed specifically for trouble-free operation on the oil or water leg of a treater, this valve is pressure rated, operationally tested to 60 pounds working pressure. The Buna-N disc insures tight shut-off and the valve has a rotary stuffing box with Teflon seal to prevent leakage. This balanced treater valve is unaffected by upstream or downstream pressure changes and has a lift lever for manual dumping. The three available sizes are the 26 SWA (two-inch screwed angle type body); the 36 FWA (three-inch flanged angle type body); and the 46 FWA (four-inch flanged angle type body).

Circle No. 12 on Postcard

Single Phase Motor

A new single phase motor that is both capacitor-start and capacitor-run is available from the Westinghouse Electric Corporation. Called the type CAP-2, the motor is made in 5, 7½, and 10 horsepower ratings and is a 4 pole, 220 volt, 60 cycle motor. Capacitor-run motors operate efficiently at near-unity power factor and their design is such that starting current is reduced about 25 percent with the same high starting torque. The auxiliary winding remains in the circuit during operation and is in series with the running capacitors. Relays merely remove the starting capacitors when the motor approaches full speed. The main winding is directly across the line. Where three phase power is not available, this new design will permit the use of larger single phase motors for such applications as air condition units, oilwell pumping, and many farm jobs such as hay and grain drying and feed grinding.

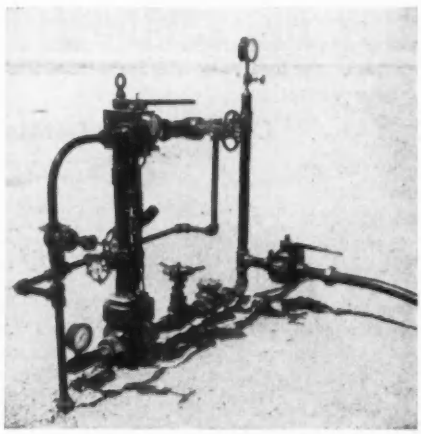
Circle No. 13 on Postcard



Quick Change Piston

Pioneer Well Tools, Inc., has developed a "Quick Change" slush pump piston with replaceable swabs that allow change of rubbers or complete piston without removing rod from the liner. This item has been field tested and improved over a period of two years under a wide range of conditions. The use of quality materials provides savings in time and equipment without sacrifice of efficiency and long life of the piston. The design features which make the piston practical include a coarse acme thread on the forward end of the piston hub and protection against fluid cutting at the critical points. For the pulling operation there is available a hydraulic puller and a mechanical screw jack puller.

Circle No. 14 on Postcard



Kennametal Check Valves

The Kobe Free Pump, used for pumping oil wells after they have ceased to flow, is a radical departure from conventional systems of pumping with walking beams and rods, and offers dependable means of lifting oil from tremendous depths. For one of the most critical parts (ball-and-seat valves) of the unit, Kennametal serves as the only satisfactory solution that has been found in 20 years of research.

A Kobe Free Pump consists of a double acting hydraulic engine directly connected with a pump which is also double acting. Entire unit is in the bottom of the oil well and hydraulic power, generated and controlled from the surface, is piped down to operate its hydraulic engine. When it was introduced in 1932, the unit (engine and pump) was lowered to bottom on a string of small tubing which also served as the conductor for the power fluid, but in a more recent development tubing strings have been arranged so the unit could be circulated in or out of the wells, free of any rigid connection, and has thereby become known as the Kobe Free Pump.

Kennametal tungsten carbide serves in the pump as the material for ball-and-seat check valves. Requires are three sets of Kennametal ball-and-seat checks for both intake and exhaust flow at each end of the pump cylinder—a total of 12 ball-and-seat checks. Each set of three has spring loaded followers to control ball movement.

Circle No. 15 on Postcard

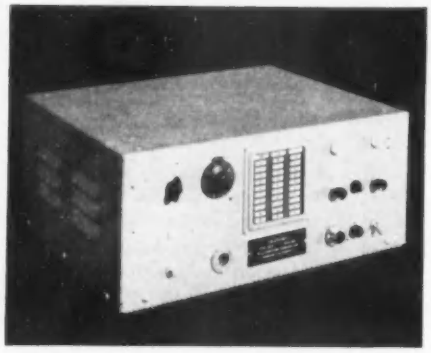
Two-Speed Chart Drive

A chart drive which instantly increases chart drive speed automatically when a variable exceeds predetermined limits has been announced by the Industrial Division of Minneapolis-Honeywell Regulator Company. Called a two speed chart drive, the mechanism is designed for use in Honeywell's single-record strip chart instruments

Save time! Keep informed! Circle numbers on postcard, page 281

and for conversion in the field of single-speed instruments already in use where added versatility is desirable. The new two-speed drive uses a planetary gear train which functions automatically to boost the chart speed 30 or 60 times (depending on the model) when the process varies beyond certain pre-set limits. When normal conditions return the chart speed drops to its usual pace. A manual switch on the drive unit allows speed changes for precise charting of new process tests or whenever a more open and legible record is needed.

Circle No. 16 on Postcard



Teleducer

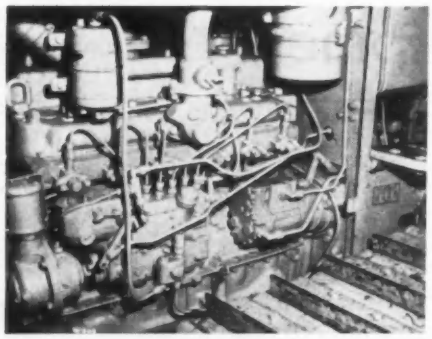
The Teleducer, Type 24A, which automatically converts analog voltages into decimal digits with an accuracy of 0.1 per cent (1000 counts full scale) has been developed by Telecomputing Corporation. The Teleducer operates upon demand, digitizes an input voltage and holds the digital representation for a controllable period of time for purposes of display, recording or any desired readout form. The digital output can be recorded by means of punched cards, an electric typewriter, magnetic tape or punched tape. The instrument digitizes low voltage without d.c. amplification and high voltage by means of attenuators. It uses a simple-bridge balancing circuit which does not hunt or oscillate and requires only 0.8 second or less to reach balance.

Circle No. 17 on Postcard

Bearing Calculator

A new calculating device which supplies bearing users with information necessary in the selection of ball thrust bearings has been introduced by Aetna Ball and Roller Bearing Company. Made in convenient handling size, its circular sliding scale provides the user with simple means of converting bearings capacities (load, speed and life) as required for any given application into terms of rated bearing capacities. In effect, it selects the proper bearing size for the application under consideration without tedious pencil and paper calculations.

Circle No. 18 on Postcard



Hydraulic Cranking Motor

The Hydrotor, a product of Hydramotive Inc. of Cleveland, Ohio, is designed for quick starting of heavy duty engines. It eliminates the use of storage batteries and electric or pneumatic starters for cranking these engines. The Hydrotor has been tested for more than 73,000 starts with no visible resultant damage. Among its advantages are its independent cranking at all temperatures in all climates, the higher cranking speeds with less bulk weight resulting from higher torque characteristic of hydraulic motor constructed from aluminum permanent mold casting, and the two cranking systems in one, since Hyrdotor used in combination with recharging pump provides automatic cranking with hand pump available for emergencies. The Hydrotor, being non-electric and of aluminum construction, is completely explosion-proof. For installations requiring frequent starting, a small displacement engine driven pump and unloading valve are furnished to automatically recharge the hydraulic accumulator during engine operation.

Circle No. 19 on Postcard

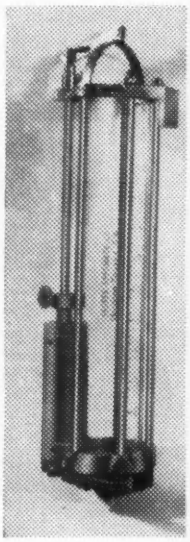
Field Centrifuge

A new centrifuge for the API base sediment and water test in the oil field is being manufactured by International Equipment Company. The six-volt tester is more compact than previous models requiring less room in the gauger's car or truck. Other important improvements are a rheostat speed regulator with off position; a pilot light; numbered head positions; top motor removal facilitating motor servicing; spark-proof aluminum construction; and receptacles for tube storage.

Circle No. 20 on Postcard

Protek Oil Thief

The new Protek oil thief features a barrel of clear plastic which permits viewing of sample without danger of shattering. The valve at the bottom may be tripped either by bumping the tank bottom or by jerking the single lowering chain. The valve closes on an "O" ring valve seat made of resilient Hycar rubber an important feature which lessens the harmful effect of grit from the tank bottom. The insert, or valve seat, will not soften in oil, will outlast metal seats, and is easily replaceable. The Protek oil thief body is bronze. Adjustable spring and trip mechanism are stainless steel for trouble-free operation. It is available from the Protek Specialty Company in 12-inch, 16-inch, 18-inch, 24-inch and 26-inch sizes.



Circle No. 21 on Postcard

Heavy Duty Engine

A new heavy duty engine is being produced at The Lauson Company. Built for long life on tough jobs, the P-25 engine is said to be ideal for garden tractors, pumps, saws, conveyors, concrete mixers and oil field and road equipment.

The engine's special air cooled design is suitable for heavy duty use. Its dust and moisture proof outside magneto with impulse coupling insures easiest starting. Developing 3.70 horsepower at 1800 revolutions per minute, the engine peaks at 6.30 hp at 3600 rpm. Heavy duty ball bearings at both ends of the counter balanced crank shaft give it the smooth flow of power. Both the crank shaft and the connecting rod are of heat treated drop forged steel. The replaceable steel backed connecting rod bearing liners are babbit lined. Its fly ball governor runs in oil.

Circle No. 22 on Postcard

Temperature Regulator

The Powers Regulator Company of Skokie, Ill., has announced a new self-operating temperature regulator built especially for control of heaters and treaters known as Powers No. 11-OFT regulator. The thermal system has over-heat protection and the powerful two-ply bellows and single seat composition disc valve assures tight shut-off. The valve stem lubricator helps give closer control, reduces packing gland troubles. The regulator operates efficiently down to 60 degrees Fahrenheit below zero. The bulb well is cadmium plated steel and capillary tubing is the extra heavy indestructible type, ten feet long.

Circle No. 23 on Postcard

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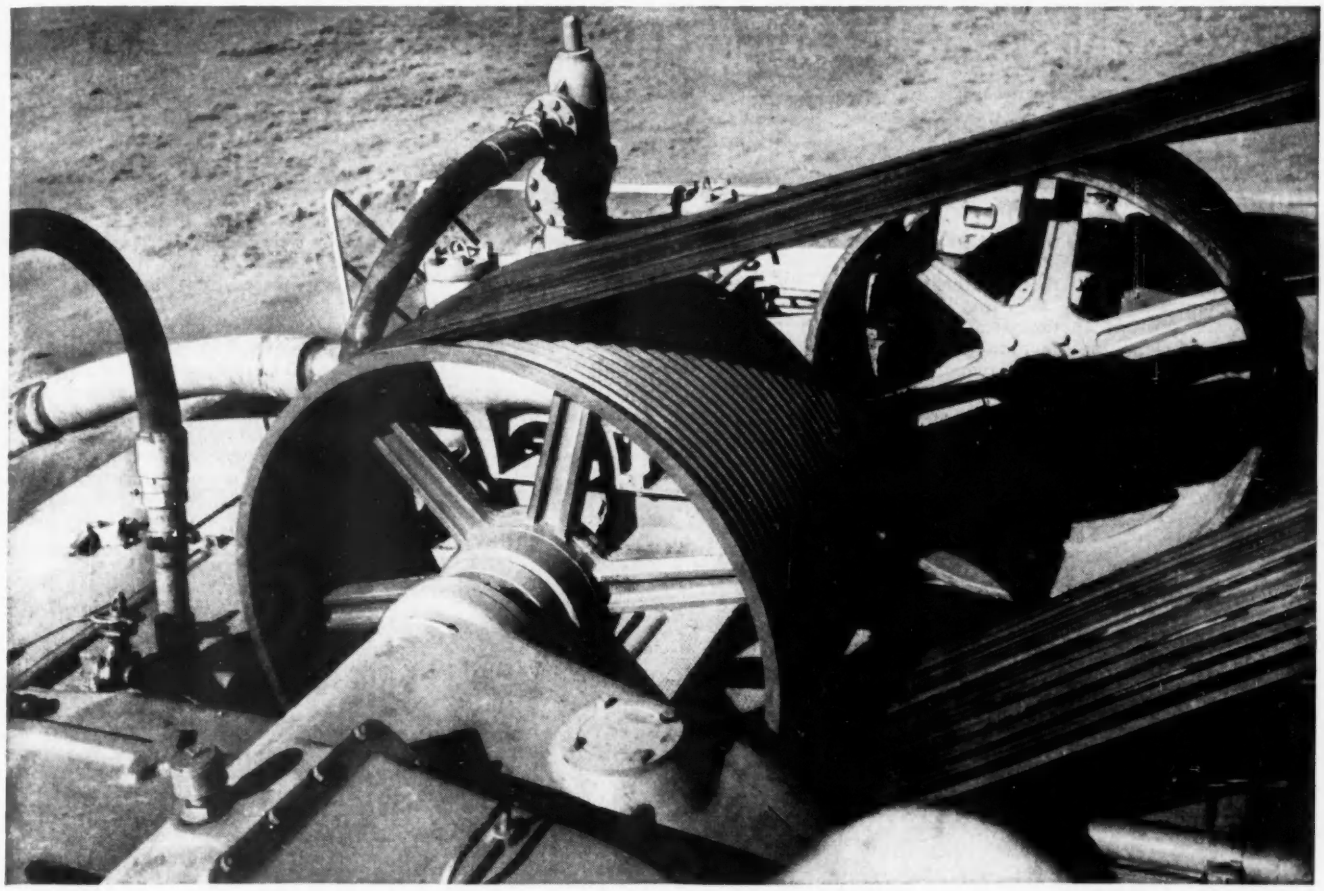
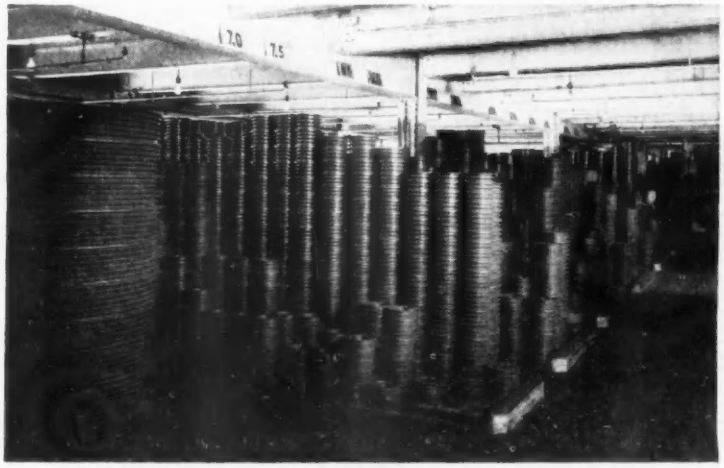


How much do sheave troubles cut your production time?



YOU DON'T HAVE TO WAIT for delivery of Worthington sheaves. Local distributors in all oil field areas are well stocked with most sizes. And they're backed up by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa, and New Orleans.

Sheaves can be headaches.

If they're made with solid hub and bored for tight fit on the shaft, they're tough to get off. As a result, valuable production time is wasted during removal for shaft maintenance.

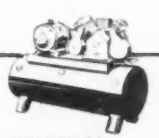
If they're built with solid hub and loose bore for quick, easy removal, they often don't hold the shaft tight enough to withstand heavy shock loads without slipping. Again you lose production time.

Not so with the Worthington QD! This sheave was especially designed to meet the demands of oil-production men. Its unique two-piece construction makes it easy to get on, easy to get off. But its heavy-duty, taper cone friction grip hugs the shaft tight, even against the heaviest shock loads.

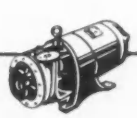
It'll pay you to standardize on the Worthington QD*. Worthington Corporation, Oil City, Pennsylvania.

*Reg. U. S. Pat. Off.

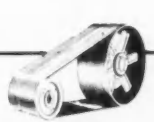
MV.3.6



COMPRESSORS: AIR-COOLED, WATER-COOLED



PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER



MULTI-V-DRIVES: QD SHEAVES AND V-BELTS

VARIABLE SPEED DRIVES: WORTHINGTON ALLSPEED DRIVE

WORTHINGTON

Mechanical Power Transmission

Buy these Worthington standard products from your local distributor

New Catalogs and Equipment Literature

Slings for Industry

"Slings for Industry" is the title of a new brochure by Macwhyte Company. Slings having approximate breaking strengths of 1000 pounds to 243.4 tons are listed with safe loads shown in tons for various angles of use. This folder contains sling data, pictures of slings and drawings of various types. Three body styles are explained, the Atlas eight-part round-braided body, the Drew six-part flat-braided body, and the Monarch single-part body.

Circle No. 24 on Postcard

Diesel Engines

Five Cummins diesels manufactured by Cummins Engine Company, Inc., and 17 standard models of Euclid equipment they power are described in a 16-page booklet published by the Euclid Road Machinery Company. Entitled "Cummins Powered Euclid Equipment," the booklet describes the 165 hp Model HRB-600; the 180 hp Model HRBB-600; the 200 hp Model NHB-600; the 275 hp Model NHBS-600 and the 300 hp Model NHRBS-600 (both single and dual units) Cummins diesels in Euclid equipment ranging from the 15-ton rear-dump Euclid to the 40-ton bottom-dump Euclid coal hauler.

Circle No. 25 on Postcard

Fire Pumps

Ingersoll-Rand Company has made available a descriptive bulletin on its line of horizontal, single-stage and vertical multi-stage fire pumps. Both types of fire pumps have been approved by the National Board of Fire Underwriters and the Associated Factory Mutual Fire Insurance Companies for permanent installation in fire protection systems of the hose line or sprinkler type. Cross section views with additional descriptions of the design, construction and performance of these pumps are contained in the bulletin.

Circle No. 26 on Postcard

Flexible Metal Hose

Titeflex helically-wound flexible metal hose and Uniflex helically-corrugated flexible metal hose are illustrated and described in a new catalog published by Titeflex Inc. In addition to complete descriptions and specifications for flexible metal hose, fittings and assemblies, the catalog contains information for ordering Titeflex flexible metal conduit and ferrules, Uniflex hose assemblies, ignition shielding and components for reciprocating engines, Titeflex bendable pipe and Titeflex high and low frequency leads. In the engineering data section are charts showing frictional losses versus flow rates for various sizes of metal hose and conduit.

Circle No. 27 on Postcard

Hard Facing Electrodes

Alloy Rods Company, York, Penn., has issued a new 12-page catalog in color on its lines of Wear-Arc hard-facing electrodes and Wear-Flame hard-facing rods offered in nine and four basic types. Intended for fact and economical rebuilding and hard-facing for correction of wear patterns, Wear-Arc electrodes and Wear-Flame rods have applications in straight abrasion, abrasion and sever impact, abrasion and light impact, abrasion and compression, abrasion and corrosion, abrasion and heat, abrasion, heat and impact and abrasion, heat and corrosion. The catalog copy is presented from the "how to do it" standpoint. Three pages are devoted to an application guide citing wear parts, types of wear and the correct electrode or rod to use in 13 major industrial applications on about 75 common types of hard facing problems.

Circle No. 28 on Postcard

Air Cooled Engines

A catalog with more than 260 pictures of mechanized equipment at work is being distributed by Wisconsin Motor Corporation. The firm's heavy duty air cooled engines for all climates are illustrated with specifications and dimensions given.

Circle No. 29 on Postcard

Lubrication Bulletin

"Lubrication of Murray Turbines" is the name of a new publication of Murray Iron Works Company now available. The illustrated bulletin shows typical installations of Murray turbines and presents information on the care of the oiling system, turbine lubricants, lubricating oil recommendations, reduction gears and gear units, and vertical turbines.

Circle No. 30 on Postcard

Gear-Motors

The function, design and application of gear-motors are described in a new publication announced by General Electric Company. Designated as GEA-1437H, the guide describes the standard types of G. E. Tri-Clad gear-motors with ratings from 1/6 up to 200 horsepower. Cut-away photographs show the relative position of the parts which are distinctive to the design of each motor. A table listing more than 200 gear-motors applications, explains how to select the proper motor depending on use, load classification and length of daily operation.

Circle No. 31 on Postcard

Polyvinyl Chloride

Boltaron 6200 is a rigid unplasticized polyvinyl chloride having a wide range of applications. It is resistant to corrosion caused by organic and inorganic acids, alkalies, alcohol and foodstuffs. A folder and a data sheet giving basic information about Boltaron 6200 has been distributed by H. N. Hartwell & Son, Inc. The bulletin lists properties of Boltaron, the method of installation and applications of the product.

Circle No. 32 on Postcard

Multimatic Rotary

The type 205-B multimatic rotary, which has built-in, air-actuated slip-operating mechanism and other new features, is presented by The National Supply Company, Pittsburgh, Pa., in a 16-page, illustrated brochure. The bulletin describes the equipment, which is designed for any depth drilling, its features, construction details, operations and specifications.

Circle No. 33 on Postcard

Rotating Air Unions

As an aid to manufacturers and users of pneumatic clutch equipment, Deublin Company has published literature illustrating and describing its complete line of rotating air unions and auxiliary equipment. The new bulletin includes details on two sizes of unions for single passage service; the story on the new Deublin Deu-Plex union for double-passage applications; and facts on the new chatterproof quick-release valve.

Circle No. 34 on Postcard

Save time! Keep informed! Circle numbers on postcard, page 281

Letters

TO THE EDITOR

• About Iranian Oil

I wonder if you would allow me to comment on the article, "IRAN FINDS TWO BUYERS FOR ITS OIL," which appeared on page 90 of your July issue.

To begin with, no court in the world has ruled against Anglo-Iranian Oil Company on the question of the ownership of oil shipped from Iran since the Company ceased to operate the Iranian oil fields and Abadan refinery in 1951. On the other hand, the only court which has so far given a ruling on the title of such cargoes is the Aden Supreme Court which fully supported Anglo-Iranian's claim to title when it sued an Italian company shipping Iranian oil.

When oil from Iran was landed in Italy and Japan, Anglo-Iranian took prompt legal action and applied in the local courts for orders that the cargoes should not be sold pending the conclusion of legal proceedings to determine their ownership. Although these applications to "freeze" the oil were refused, the courts did not concern themselves with establishing the rightful ownership of the oil. Cases covering this main point have yet to be heard in both Rome and Tokyo.

One more point: at the time of writing Supor Company has not marketed any of the Iranian oil which they shipped to Italy.

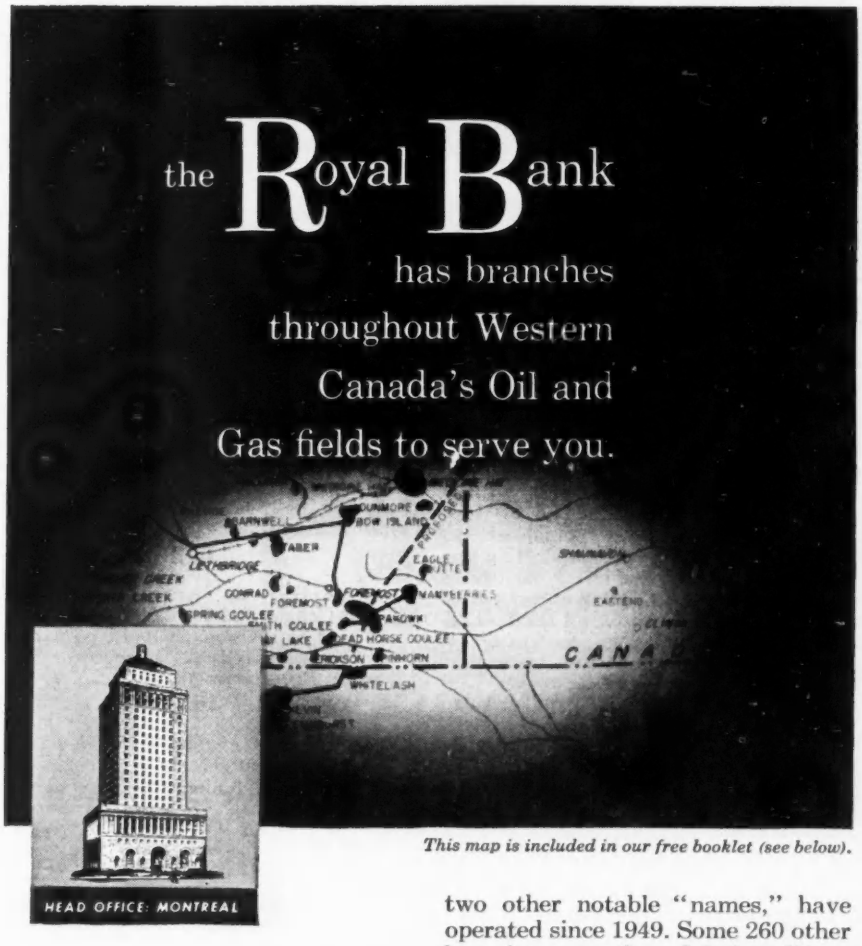
A. E. C. Drake,
Representative in U. S. A. of
Anglo-Iranian Oil Co., Ltd.

• WO Rings (Phone) Bell

I have intended for some time to comment to you on the effect of our brief article entitled "What About Southeastern Colorado?" which was published in WORLD OIL last winter. We were very much surprised at the number of written inquiries received as a result of this article and even more surprised by a number of 15-20 minute long distance telephone calls, some from the west coast. All persons requested more detailed information, which we could send them in the form of one of our formal publications.

It is apparent that your journal reaches a different segment of the oil industry and that many of the persons in this segment would not know of the availability of helpful geological reports if it were not for such articles. In a way these people are our customers, just as they are yours, and we are happy to be able to serve the oil industry better through such articles.

John C. Maher
Supervising Geologist,
Fuels Branch,
U. S. Dept. of Interior



This map is included in our free booklet (see below).

Whenever the need has arisen in Canada's oil and gas fields, the Royal Bank has been on the spot, with assistance, encouragement and practical help for producers and allied industries.

Our branch at Leduc, Alta., was opened the day after the first producing well was brought in, in 1947. Branches at Devon and Redwater, two other notable "names," have operated since 1949. Some 260 other branches serve Canada's four Western "oil" provinces.

Our Oil and Gas Department provides a unique *Special Bulletin Service*, containing up-to-the-minute information on all important aspects of the industry. For a free booklet containing bulletin titles, and other useful information, write: Oil and Gas Department, 102 Eighth Ave., Calgary, Alberta.

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Canada's Oil Bank

Total assets exceed $2,675,000,000

What's Happening

AMONG MEN IN THE INDUSTRY

J. J. Frommer, manager of The Ohio Oil Company's Shreveport Production Division since 1944, has retired after 34 years of service with the company. Frommer joined the company as foreman in Ranger, Texas, in 1919. He became district foreman, superintendent, Oklahoma District superintendent, and Houston division superintendent. In 1940 Frommer moved to Shreveport as assistant division manager and superintendent of production.

J. J. Frommer

W. B. Berwald, assistant Shreveport division manager, succeeds Frommer as manager. Other appointments are **Glen B. Gariepy,** Los Angeles Division geologist, to become assistant Shreveport Division manager; **R. G. Kurtz,** senior geologist at San Antonio, Texas, named Los Angeles division geologist succeeding Gariepy.

•

J. B. Hamilton has been appointed superintendent of production for Sun Oil Company's Rocky Mountain Production Division, Denver. Formerly Hamilton was district superintendent of production for the West Texas District in the Southwest Division since 1947. Other Southwest Production Division changes are **Cecil A. Colville,** Midland, Texas, from assistant superintendent, West Texas District, to district superintendent; **E. Lloyd Kownslar,** field superintendent, Colorado City, Texas, to assistant district superintendent; **Nelson J. Sapp, Jr.,** foreman, Garcia area, McAllen, Texas, to Colorado City, Texas; **C. C. Bengston,** production superintendent, Calgary, Alberta, Canada, to assistant field superintendent, with headquarters in Midland, Texas, and **R. K. Beggs,** foreman, West Texas District, to the Gainesville area, East Texas District as assistant field superintendent.

•

Harold D. Hansen has been appointed petroleum engineer for the Colorado-Nebraska field of The British-American Oil Producing Company's northwestern district. Hansen joined British-American after seven years in Peru and Colombia with the International Petroleum Company, Ltd. He went to South America in 1946 and returned to the states in May, 1953, joining British-American in June.

•

Leslie P. Smith of Whittier, Calif., has been appointed purchasing agent for Western Gulf Oil Company. Smith has been with the company since 1946. He succeeds **Roy M. Fly,** who recently resigned to accept a position with the PAD in Washington, D. C.

Carl E. Davis, Midland, Texas, formerly district landman for Sunray Oil Corporation, has been transferred to the company's general offices in Tulsa and **John W. (Jack) Goddard,** Midland, is joining the Sunray organization to be district landman and manager of the company's Midland district exploration office. Davis, who joined Sunray in 1950, will be a staff assistant in the Exploration department in Tulsa. Goddard has been operating as an independent lease broker for the past ten years having formerly been associated in Land department activities with T. B. Slick, the Prairie Oil & Gas Company, and the Sinclair-Prairie Oil Company. In other Sunray Exploration department shifts, **Robert M. Robbins,** geologist in the Albuquerque, N. M., district has been transferred to the Denver, Colo. office. **Robert L. Spears,** geologist, formerly in the Sunray district office, Wichita, Kansas, has been transferred to Albuquerque.

•

J. D. Hunnicutt has been named New Orleans area land agent for Shell Oil Company to replace **J. H. Hesterly,** who retired. Hunnicutt, who has been with the company 20 years, takes over responsibility for area land operations in the Jackson, Mississippi, and Tallahassee, Fla., divisions. Formerly he was land man for Shell in Florida and Louisiana.

•

Daniel F. Sullivan, Ventura, Calif., geologist for Continental Oil Company, has been promoted to division geologist with headquarters at Bakersfield. He succeeds **E. D. Sherman,** who resigned.

•

Walter D. Rose, engineering consultant in Houston for Continental Oil Company, has been appointed senior research engineer. Rose served with Gulf Oil Corporation and The Carter Oil Company research staffs prior to becoming a consultant in Houston.

•

Dr. John N. Dew and **Dr. Philip E. Bocquet,** recent chemical engineering graduates of the University of Michigan, Ann Arbor, have been appointed research engineers for Continental Oil Company.

•

Claude E. Leach has been appointed manager of the Geological department, Mid-Continent Division of Tide Water Associated Oil Company. Leach will have headquarters in Houston and be responsible for all geological work in Tide Water's Mid-Continent Division.

•

Olen Lane, Los Angeles, Calif., western region general manager for Continental Oil Company, has been elected a vice president by the board of directors. Lane will continue to serve as Conoco's western region general manager with headquarters in Los Angeles.

J. F. Drake

S. A. Swensrud

J. Frank Drake, board chairman of Gulf Oil Corporation for the past five years and president for the previous 17 years, is assuming a less active role as chairman of the executive committee. **Sidney A. Swensrud,** president since 1948, was elected chairman of the board and becomes chief executive officer. **William K. Whiteford,** formerly executive vice president, was elected president, becoming chief administrative officer. **F. C. W. Paton** was named vice president in charge of foreign marketing. All other officers were re-elected.

W. K. Whiteford

•

C. H. Keplinger and **J. M. Wanenmacher,** petroleum engineers and geologists of Tulsa, Okla., announce that **Lee A. Keeling** has joined their firm as petroleum reservoir engineer and will be stationed in Tulsa, where he will specialize in the valuation of waterflood projects. Keeling has been employed by the Magnolia Petroleum Company for the past four years and has worked in Oklahoma, New Mexico, West Texas and Kansas.

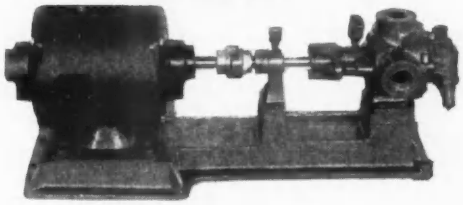
•

Augustus C. Long, president of the Texas Company, has been elected a director of Seaboard Oil Company of Delaware to fill the vacancy resulting from the resignation of **Col. Harry T. Klein.** Col. Klein, formerly president of The Texas Company, had been a director of Seaboard since 1933.

•

Dr. A. B. Bryan has been named manager of the geophysical division of The Carter Oil Company's Exploration department and coordinator of research for Carter's exploration and production activities. Bryan will have the responsibility for furthering Carter's efforts particularly in the coordination of operating problems with the overall research program.

DEPENDABLE POWER for PUMPING by VIKING



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Pale Face use'um Geol-um-graph to log well and find heap much oil! Geol-um-graph tell how drill fast, stop, go . . . even tell where oil hide in ground under tepee! That why Pale Face save'um much wampum when log *well* while drilling with Geol-um-graph!

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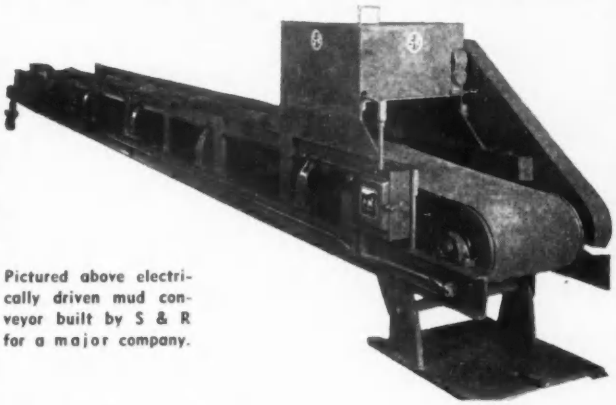
S & R SPECIAL *Custom Built* MUD CONVEYORS FOR DRILLING BARGES



Pictured above electrically driven mud conveyor built by S & R for a major company.

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Built for heavy duty service with quality materials equipped with reversible belt, troughing idlers, protected easily accessible drive housing. Operates efficiently all positions to 35° off horizontal. Built-in sizes to 40 feet.

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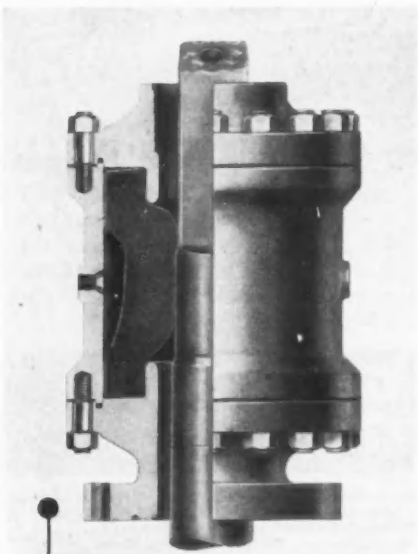

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Paul R. Turnbull William H. Justice

Paul R. Turnbull has resigned as drilling and production manager for La Gloria Corporation in Corpus Christi, Texas, to become an independent oil producer. He will be affiliated with **B. F. Vaughan, Jr.** and **Frank P. Zoch, Jr.** in Corpus Christi. In addition, Turnbull will serve as president of Del Mar Drilling Company, of which he has been one of the owners during the past few years. Succeeding Turnbull in the La Gloria position is **William H. Justice**, technical advisor for La Gloria since 1948.

•

Harrison Guio has retired from Tide Water Associated Oil Company after more than 33 years of service. Guio was legal representative of the company in southern California and handled general administrative work for all other departments of the company. He was a member of the Petroleum Industries Committee of the Western Oil and Gas Association from the time of its inception and also was the alternate representative for that company on the board of directors of the Association.

D. H. Elliott has announced the opening of his photogeologic consulting office in Casper, Wyo. Elliott has been doing photogeologic interpretation of the Rocky Mountain states in Casper during the past 2½ years with Stanolind Oil and Gas Company and more recently with Bruce Anderson, independent.

•

L. E. (Kim) Foust, Tide Water Associated Oil Company land agent, San Joaquin Valley, was honored recently upon completion of 50 years continuous service with the company.

•

Blaine Dunbar, oil operator, has announced the removal of his offices to 417 Bramletter Building, Longview, Texas.

•

Lynn K. Lee, geologist and manager of exploration for The Pure Oil Company, has retired after 28 years with the company. **Donald M. Davis**, an assistant to the manager of exploration, has assumed the duties of manager of the department. Davis has been with Pure Oil for 26 years.

•

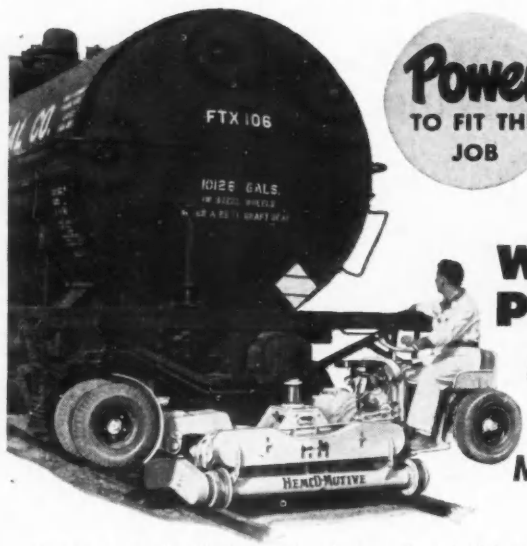
J. M. Lloyd has been appointed vice president and general manager of the Rio Bravo Oil Company, an affiliate of Southern Pacific Company, to succeed the late **Sid T. Childress.**

•

Erwin J. Poizner, formerly with Shell Oil Company, is now a consulting geologist with offices at Princeton, Ind.

•

John D. Carey has resigned as landman in the Kansas-Oklahoma area for Continental Oil Co., and is now landman for Natural Gas and Oil Corporation at Wichita, Kansas.



Power TO FIT THE JOB
Power TO FIT THE MACHINE

WISCONSIN-POWERED · HEMCO-MOTIVE Switching Unit Moves 3 Cars at a Time!

You saw it at the Oil Show. Now look at this HEMCO-MOTIVE unit as needed equipment for switching and spotting cars on your own sidings. This versatile, agile "locomotive" can *pull* or *push* 360 times its own weight.

The 25 hp. Model VF4 Wisconsin Air-Cooled Engine supplies power for all operating phases — road mobility, climbing up and over rails, operating hydraulic lift that "couples" the unit to the car, handling all switching maneuvers with a 7400-lb. drawbar pull applied to 4-wheel drive . . . moving up to 3 loaded tank cars at a time, at a rail speed of 150 ft. per minute!

It's another typical Wisconsin Heavy-Duty Air-Cooled Engine application, illustrating how these fine engines fit a great variety of *jobs* and *machines* . . . including many oil field utility units.

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

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We acknowledge the assistance of our many friends and to those who have had a part in this development we express our keenest appreciation.

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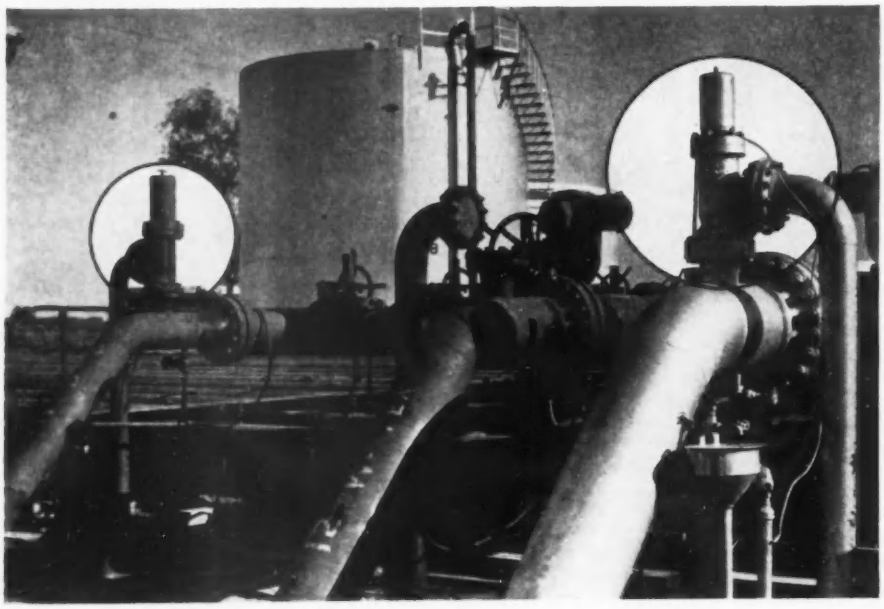
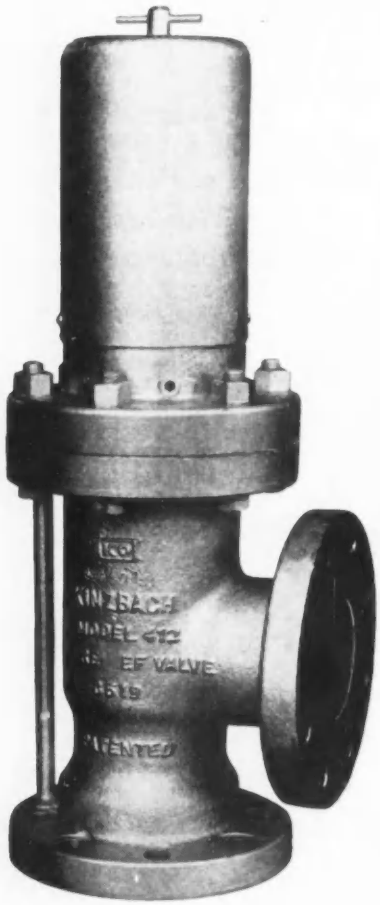


Positive Protection Against Pressure Surges



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for Pipelines and Refineries

When a pressure overload in the line is reached, the Kinzbach Model 412 Relief Valve opens instantly to full capacity. This valve provides automatic resetting at a pre-determined pressure drop, positive seating and facilities for functional testing.

The Model 412 uses line pressure for opening and closing. The opening pressure is preset by application of a dead weight load. Opening and closing action is positive and reliable. The pre-set pressure never changes.

Kinzbach Model 412 Relief Valves are available in 2", 3", 4", 6" and 8" sizes for working pressures up to 1000 p.s.i. Write for Bulletin RV412 for full technical data.

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Harold B. Renfro has announced the establishment of his office in Dallas, Texas, as a petroleum consultant. Renfro was graduated from the University of Tulsa and received his M.S. and Ph.D. degrees in geology from the University of Wisconsin. He served on the geology faculty at the University of Tulsa until June, 1948, when he joined Stoddard Oil Company of Dallas as engineer and geologist. In his new role of consultant, Renfro will engage in appraisals, valuations and unitization work.

Harold B. Renfro

•

Virgil B. Harris has been elected a director and vice president—operations and **Mac D. Oliver** has been elected director and vice president—engineering of San Juan Oil Company of Dallas. Harris, who has been with the company for the past two years, formerly was with Core Laboratories, Inc., and a district superintendent of Barnsdall. He is also a vice president of Mazda Oil Corporation, another company managed by San Juan. Oliver formerly was with the firm of Cable and Stine in Wichita Falls. He is the managing partner for Bradey, Oliver and Associates, petroleum consulting firm operated in connection with San Juan Oil Company.

•

R. F. Darrow, Griffin, Ind., district production superintendent for Continental Oil Company, has been promoted to production superintendent of the Kansas division, with headquarters in Wichita. He succeeds **T. C. Davis**, who has resigned. **C. M. Tarr**, also of Griffin, district petroleum engineer, has been promoted to district production superintendent.

•

Ben R. Howard is supervisory geophysicist with Warren Petroleum Corporation. Howard replaces **John F. Anderson.**

•

W. Baxter Boyd has been named vice president—Geological, Exploration and Land departments of Republic Natural Gas Company. A graduate of the University of Oklahoma, Boyd has been active in the petroleum industry for the past 25 years.

•

Glenn W. Poorman has been appointed general manager of the Supply department of Esso Standard Oil Company. Poorman succeeds H. J. Nichols, Jr. in that capacity and as chairman of the Tankage and Inventory Committee and member of the Committee for Staff Departments Management Development program. Nichols, a director of Esso since 1946 and a director of Plantation Pipe Line Company, an affiliate, is retiring after 30 years with the company.

•

Jim H. Findley, formerly with The Nowery Drilling Company, and Ben Propst of Concord, N. C., have organized the P & F Drilling Company, 906 Shelby Building, Shreveport, La., and will do contract drilling in the Arkansas-Louisiana-Texas area. The company will operate medium to large power rigs.

"14 round trips through this NEOPRENE *tubing stripper... and there's plenty of life left!"*

—says **E. O. STEWART**
Houston workover contractor

Stewart well service crew removing tubing spider. (Below) Close-up of Petromec neoprene tubing stripper in place on well head after removal of spider.

OIL FIELD MEN KNOW— IT PAYS TO SPECIFY **NEOPRENE**

"We were stripping a mixed string of tubing on a fishing job out in the Pierce Junction field. When on bottom—washing over the tubing sanded in the well—pressures on our neoprene stripper rubber ran as high as 800 psi.

"Each time we pulled a joint of the fish, we stripped it and the overshot. When we'd finished—after *fourteen* round trips—the Petromec stripper rubber was still in good enough shape to use with lower pressures or with 2½" tubing."

That's Ed Stewart's experience with the Petromec "Flex-Strip" universal tubing stripper . . . one of many neoprene products serving men in the drilling business. It's a typical report on the dependability of neoprene in oil-field operations. So whether you need tubing strippers or packers or piston rubbers . . . be sure you specify NEOPRENE.

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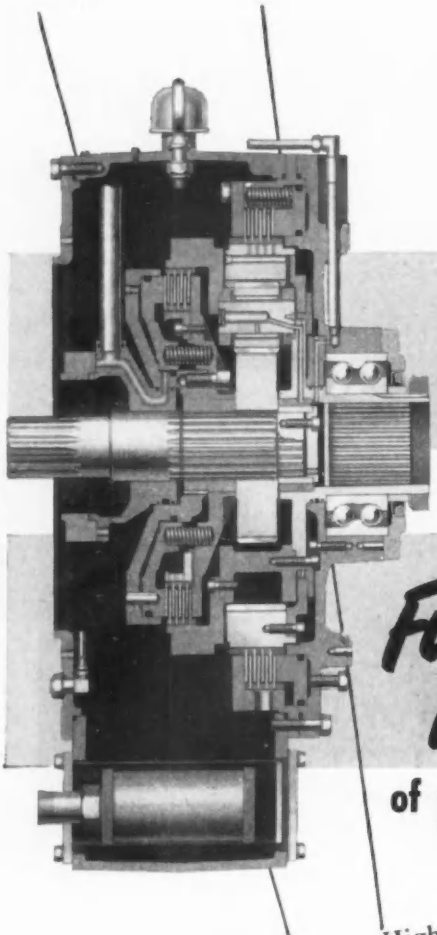

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2-SPEED TRANSMISSION

extends

Full-Range Performance

of your Torque Converters

Engineered specifically for use behind three-stage torque converters, the new Twin Disc 2-Speed Transmission—Model T-302—permits converters to deliver extended performance within their *maximum* operating range.

New Model T-302 is completely *oil-actuated*, for smoother, more positive action—designed around a planetary system with lock-up feature for *direct drive*. Installed on your 3-stage torque converter, it provides three operating positions: Neutral, Low, and High. Ratio spread is available in 2.69:1 or 3.07:1. Entire unit is self-lubricated.

To gain the advantages of extended performance from 3-stage torque converters on *your* equipment, get this newest development in transmissions. For full details on the new Model T-302 2-Speed Transmission, contact your nearest Twin Disc Factory Branch or Twin Disc Clutch Company, Hydraulic Division, Rockford, Illinois.

New Twin Disc 2-Speed Transmission, Model T-302, designed to give 3-stage torque converters extended performance within maximum operating range. Engineered for easy installation.

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BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

Jack A. Crichton has been named president, Oil and Gas Property Management, Inc., and vice president, Empire Trust Company, with offices in the Fidelity Union Life Building, Dallas. Crichton is a past vice president and director of **DeGolyer** and **MacNaughton**, Dallas, and a past vice president and director of San Juan Oil Company, Dallas. Oil and Gas Property Management, Inc., is a company formed in 1952 to acquire oil and gas properties, is capitalized at $10 million and has a current net oil production of approximately 2500 barrels per day.

Jack A. Crichton

•

Howard Kiatta has been promoted to division land and leaseman of Rocky Mountain Division, Producing department of The Texas Company and transferred to Denver. **T. O. Winn**, assistant division land and leaseman, Louisiana Division, will replace Kiatta as landman on the general manager's staff and will be transferred from New Orleans to Houston. Kiatta joined Texaco in 1918 as a clerk in the Producing department at Houston. Advancing from the position of leaseman, he was made assistant division land and leaseman of the South Texas Division in 1949 and joined the staff of the general manager, Producing department in 1952. Winn joined the company in 1923 and has been scout, chief clerk and assistant division land and leaseman.

•

Jack R. Fraser has been appointed chief petroleum engineer for Texas Eastern Production Corporation of Houston. Fraser joined Texas Eastern in 1951 as district geologist but has most recently served as division engineer.

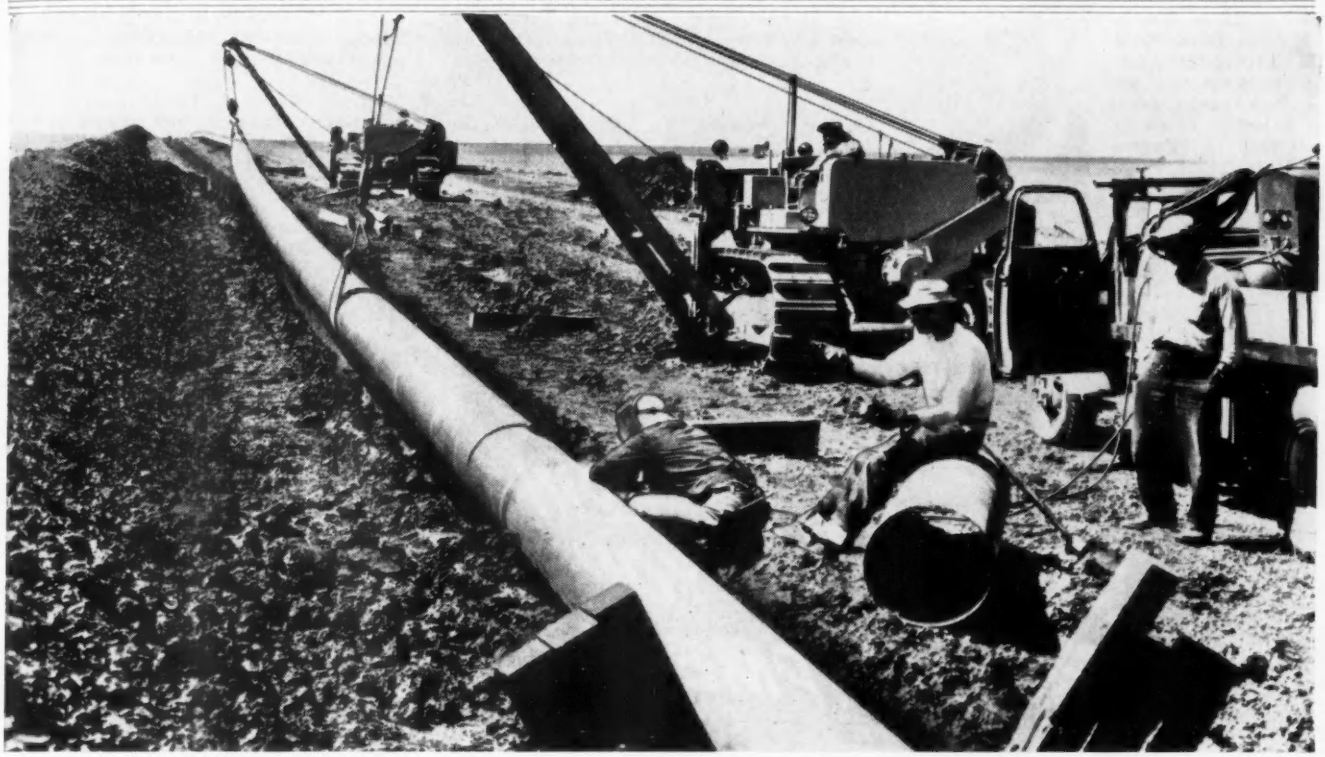
•

C. H. Dodson, manager of the Chicago Sales division of The Texas Company since 1950, has been named assistant to the executive vice president of the company. **Ben Halsell**, manager of the Boston sales division, will succeed Dodson in Chicago. **Fred Wilcox**, an engineer in the evaluation section of the production division of Deep Rock Oil Corporation, has been transferred to the company's Eastern Kansas district as intermediate engineer to supervise field development and construction in the district. **H. E. Cobb, Jr.**, has returned to the company after serving as a lieutenant in the U. S. Navy in the Korean area. Cobb has been named intermediate engineer in the production division's evaluation section.

•

C. W. Payne, geophysical consultant of Fort Worth, announces the association of **Kirby J. Warren** in a firm to be known as Payne & Warren, geophysical consultants, with offices in the Continental Life Building, Fort Worth, Texas. Warren was formerly geophysicist with Sinclair in the southern division office at Fort Worth and has had 15 years of geophysical experience with The Carter Oil Company and Sinclair Oil Company covering the Rocky Mountains, the Mid-Continent, Texas, and Gulf Coast.

PIPE LINE PROGRESS



A string of A. O. Smith line pipe on location during construction of the Interprovincial-Lakehead pipe line.

24-inch looping project to increase Interprovincial pipe line crude capacity

About 135 miles of 24-inch A. O. Smith line pipe is currently being lowered in to loop Saskatchewan and Manitoba section of 16-inch pipe in the Interprovincial Pipe Line. This will add capacity to a transmission system which, by December, will carry western Canadian crudes from the Edmonton, Alberta, area to Sarnia, Ontario.

Upon completion, this will be the world's longest crude oil pipe line, totaling 1738 miles from Redwater to Sarnia.

All the 20-inch and 18-inch pipe in the original line, presently terminating at Superior, Wisconsin, is A. O. Smith pipe. The 20-inch main runs from Edmonton to Regina; the 18-inch completes the run from Gretna, Manitoba . . . just north of the U. S. boundary . . . to Superior.

The present 24-inch installations are part of extensive looping of the 16-inch sector joining the 20 and 18-inch section.

Shipments were made from both Milwaukee and Houston mills, in supplying Interprovincial. A. O. Smith takes pride in its ability to meet delivery schedules, anywhere on this continent, with its high quality, internally expanded, welded line pipe.

A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters.

FIRSTS by A. O. Smith: Welded line pipe • Internally expanded pipe • Light-wall large-diameter pipe • World's largest producer of large-diameter welded steel pipe.

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LINE PIPE • CASING

Chicago 4 • Dallas 2 • Denver 2 • Houston 2
Los Angeles 22 • Midland 5, Texas • New Orleans 12
New York 17 • Pittsburgh 19 • San Francisco 4
Seattle 1 • Tulsa 3 • Washington 6, D.C.

International Division: Milwaukee 1

DEPENDABILITY THROUGH RESEARCH AND ENGINEERING

Jackson M. Barton of Tulsa, Okla., has been named exploration manager of Northern Natural Gas Company's Gas Supply department. Barton comes to Northern from Deep Rock Oil Corporation where he was manager of the Geological department in Tulsa. Formerly he was with the Magnolia Petroleum Company and the Cooperative Refinery Association. Barton will direct the company's program for search for new gas supplies.

Jackson M. Barton

R. G. Tribble of Houston has been named division petroleum engineer for the newly-created Gulf Coast Division of Cities Service Oil Company's oil production division. **John Forsyth** of Columbus, Texas, will replace Tribble as South Texas district engineer. **Donald Hewitt** of Odessa, Texas, has been transferred to Brownfield, Texas, as engineer in the new district offices there.

•

George P. Walker, Jr., Lafayette, La., district geologist for Continental Oil Company's southern region, promoted to division geologist, with headquarters at Houston. Walker succeeds **M. B. Morris**, who has resigned to join another company. **Phillip J. Lane**, Corpus Christi, Texas, geologist, has been promoted to district geologist with headquarters at Lafayette. In Conoco's southern region Exploration department two landmen have been promoted. **T. Harry Kaplyn**, Houston, division land superintendent, is promoted to assistant to the southern region land superintendent and **J. W. McReynolds**, San Antonio, Texas, landman, promoted to Conoco's Houston division land superintendent, succeeding Kaplyn.

•

J. E. Rouse of Tulsa, has retired as vice president—operations and member of the board of directors of Stanolind Oil and Gas Company. Rouse has been associated with the Standard group for many years, having joined Standard Oil Company of New Jersey in 1913. He was assistant general manager of manufacturing for Standard Oil of Indiana in 1933 and was loaned to the government in 1943. Rouse joined Stanolind in 1945. His work for the government included service with the Petroleum Administration for War and with the Navy Department during World War II.

J. E. Rouse

•

L. J. Thompson, manager of the Grand Rapids, Mich., sales field of Standard Oil Company (Indiana) has retired on annuity from the company after serving since 1922. **G. D. Carroll**, manager at Huron, S. D., succeeds Thompson.

•

Alvin P. Loskamp, formerly of Midland, Texas, is now associated with E. B. Noble, petroleum consultant, with offices at 854 General Petroleum Building, Los Angeles. Loskamp spent several years in geological field work in the Rocky Mountain district but since 1926 has been closely associated with the exploration and development of the Permian Basin of West Texas and New Mexico. He was district geologist for Barnsdall in the Midland area until 1940 when he became associated with Union Oil Company of California as the West Texas exploration manager and later as general manager for the West Texas-New Mexico division. Since 1950 Loskamp has been engaged in consulting work in the Midland area.

•

Officers of Cosden Petroleum Corporation elected recently are **R. L. Tollett**, president; **Nelson Phillips, Jr.**, vice president, general counsel and assistant secretary; **Marvin M. Miller, Douglas L. Orme** and **R. W. Thompson**, vice presidents; **A. V. Karcher**, secretary and treasurer; **V. A. Whittington** and **L. T. King**, assistant secretaries and assistant treasurers; and **Alma C. Gollnick**, assistant secretary.

•

John W. Miller has been named manager of the Export department of Creole Petroleum Corporation. Miller has been associated with Creole Petroleum and other affiliated companies of the Standard Oil Company (New Jersey) since 1934 when he was employed by the Standard Oil Development Company as a student engineer. Miller's appointment will enable the former manager of the Export department, **Robert W. Miller**, to devote his attention to his responsibilities as vice president and director of Creole Petroleum Corporation.

It takes modern equipment to find, produce and transport oil as fast as present demands require. It also takes modern oil field housing to satisfy families of workers. In order to make a better team in the oil fields you need good equipment plus modern housing for workers. STURDYBILT pioneered "city home" housing in oil field camps. STURDYBILT has kept pace with new designs and construction, and is STILL your best buy in oil field housing.

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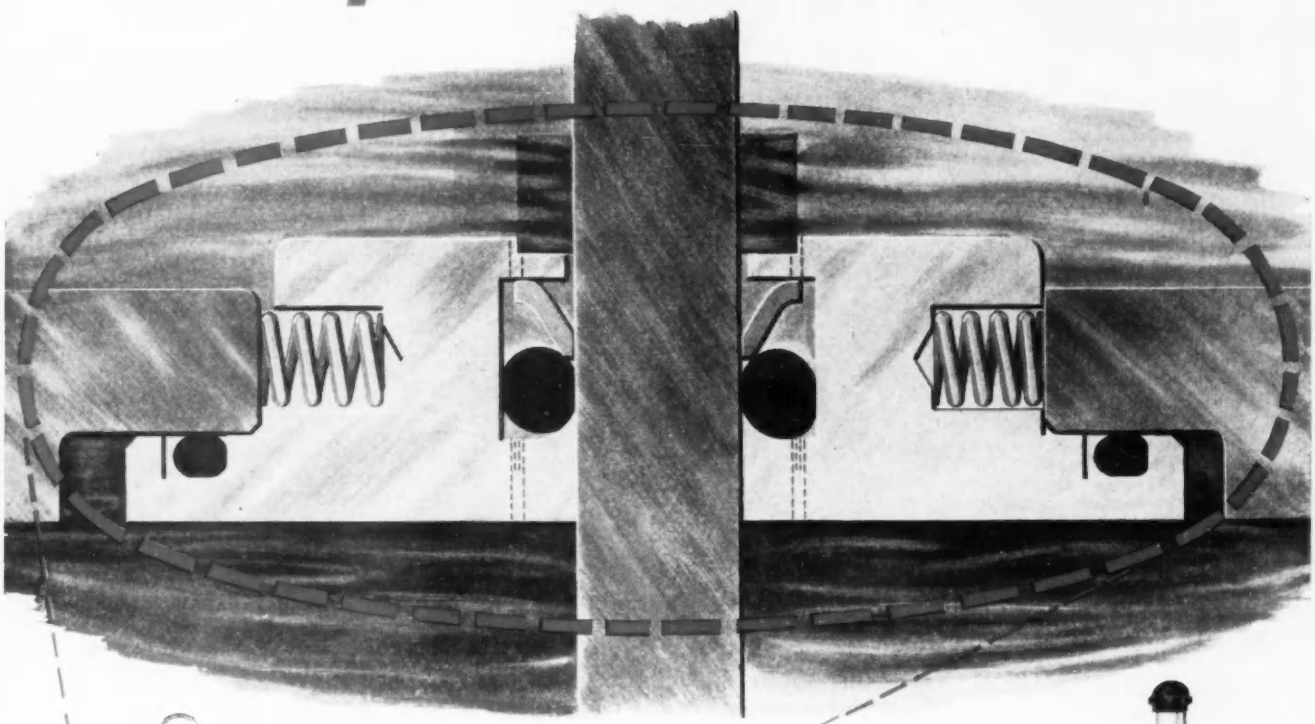
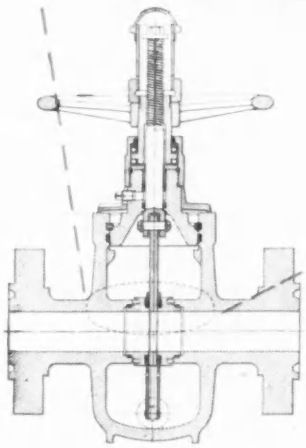
STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

Multiple SEALING Action!

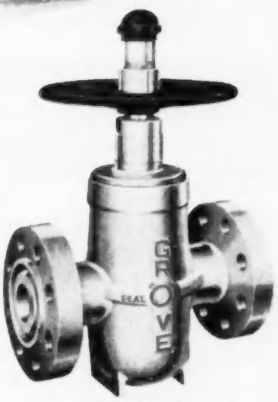




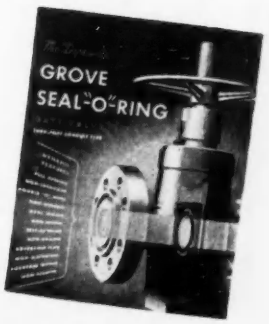
Simplest of all High-Pressure Gate Valve Designs. Opens easily—closes dead-tight with far less torque on hand wheel.

multiplied by Line Pressure

As a full opening conduit type valve, Grove SEAL "O" RING Gate Valve provides an impassable seal that shuts off bubble-tight without resorting to wedges, plugs, lubricants or other packing devices. Positive dead-tight sealing action of polished port-plate and seats is augmented by flexibly resilient "O" ring seals, retained within seat ring assemblies. Pressure in either direction of flow multiplies sealing action. The more pressure the greater the seal. Get full details, today.



Streamlined inside and out in a broad range of sizes for pressures up to 10,000 lbs.



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H. L. Phillips

H. B. Smith

H. L. Phillips has been elected chairman of the board of directors of Sinclair Oil & Gas Company, crude oil producing subsidiary of Sinclair Oil Corporation. The board also elected **H. B. Smith** president and chief executive officer of the company to succeed Phillips. The executive offices will be maintained in Tulsa, Okla., under the direction of Smith, president, and **J. W. Jordan**, executive vice president. Phillips, who has been president of the producing company since 1930, joined Sinclair Oil & Refining Company in 1916 and was made president of Sinclair Crude Oil Purchasing Company in 1922. He assumed the presidency of Sinclair Oil & Gas Company in 1930. Phillips is director of Sinclair Oil Corporation, the National Bank of Tulsa, the Great Lakes Pipe Line Company, Platte Pipe Line Company and the API. Smith joined the company in 1919, was elected a vice president in 1922 and executive vice president in 1952. Jordan entered the oil business with Sinclair-Cudahy Pipe Line Company in 1916, transferring to the producing company in 1919. He became vice president—production in 1941 and was named executive vice president in 1952.

J. W. Jordan

•

R. M. Darling, formerly assistant division engineer for Stanolind Oil and Gas Company, has been named division engineer. Other new appointments in the Houston division office are **F. L. Nelson**, assistant division engineer; **G. H. Johnston**, staff petroleum engineer; and **M. S. Kraemer**, district engineer, Houston district. **Richard L. Evans** is the new district engineer at Lake Charles, La.

•

Joseph T. Dawson, who represents Heep Oil Corporation, and **Herman F. Heep**, Western Division, announces the opening of offices in Denver at Suite 516-517 Symes Building.

•

Hubert E. Menger has been appointed vice president and manager of exploration for Monterey Exploration Company of San Antonio, Texas. During his college years, Menger worked for Shell Oil Company but joined Stanolind Oil and Gas Company upon graduation. Later he became manager of exploration for Fred W. Shield, independent oil operator of San Antonio. Another appointment announced by the company is that of **Howard E. Davis** as district geologist. Formerly he was with Honolulu Oil Corporation as district geologist in Midland, Texas.

SECONDARY MODERN RECOVERY
TECHNICAL CONSULTING
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DID YOU KNOW...

you can build peak performance into your oldest compressors!

and obviously into your newer, high speed machines, too!

INSTALLATION OF VOSS VALVES WILL DO THE JOB!

if you want peak performance . . . increased efficiency . . . greater output . . . lower power costs with utmost safety, investigate the advantages of VOSS VALVES for your machines.

VOSS VALVES provide. . . Quiet, vibration-free operation • 20 to 60% more valve area • less power consumption • low pressure loss • normal discharge temperature • lower operating costs • utmost safety.

To increase the efficiency of your compressor, send us the name, bore, stroke and speed of your machine. Our detailed proposal will be sent without obligation.

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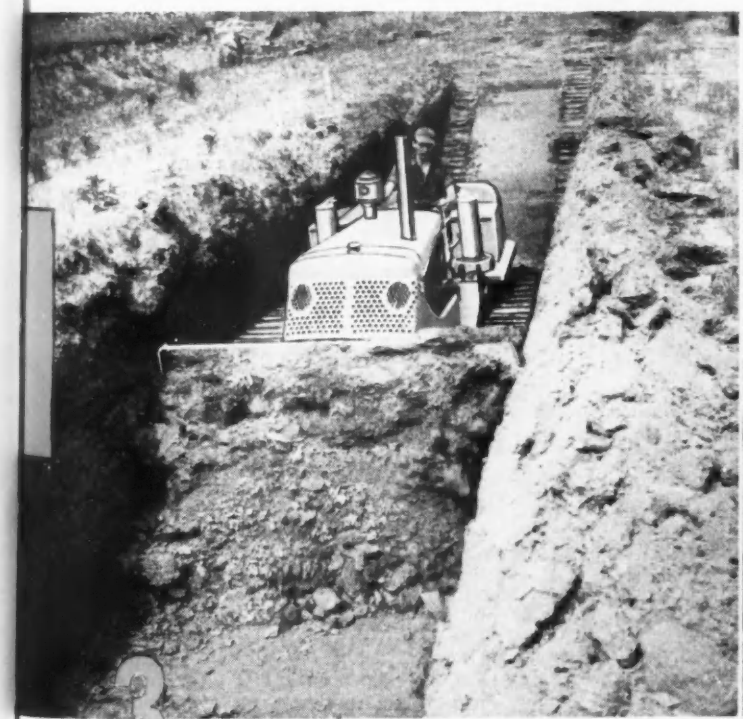
1. Starting the cut. Blade is mounted directly to HD-9 Tractor main frame. This provides a steeper penetration angle and with tractor-dozer lowered as a single unit there's real down pressure to bite into hard material. Because this new type mounting provides extra clearance, greatly increased track oscillation and better balance, this team is a phenomenal performer in mud and tough going.

2. Down she goes—fast. Note how steep blade angles reduce length of ramp — saves time, cuts waste of long approaches. For example, it gets down to a six-ft. depth with only an eight-ft. approach, eleven-ft. exit. And with no push beams blade is 1,150 lb. lighter than standard dozer. Costs less to buy, costs less to use.



3. Deep, narrow blade, powerful tractor hurries the job. With blade six inches higher than standard model, it handles a bigger vertical load. This, plus its narrow width, makes it ideal for digging the deep, narrow slush pit which drillers want. And the HD-9 Tractor with its powerful GM 2-cycle diesel engine and long, wide-tread tracks, provides the power and traction to ram out yardage in short order.

4. And here's your pit—finished in the shortest possible time. Just by pulling a single lever, operator can shift from any of the six forward speeds to any of the three reverses. And by using the high-speed reverse he can back up in a hurry—reduce waste time to a minimum. The combination of this HD-9 Tractor and the special 9X blade makes an unbeatable slush pit team.

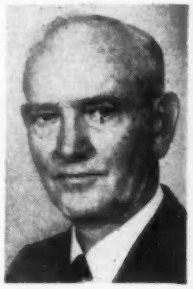
H. F. Moses

Nelson Y. Ruth

H. F. Moses, vice president of The Carter Oil Company, has been appointed deputy manager of the Exploration department and deputy chief geologist of Standard Oil Company (New Jersey). Moses will leave Carter September 1 to take the new post. At the same time **Nelson Y. Ruth,** manager of exploration, has been elected to the board of directors of Carter Oil where he will act as contact director for the Exploration department. Joining Carter in 1934, Moses became manager of the Exploration department in 1941, a year later was elected a director and since 1944 has been vice president—exploration and research. In the new assignment Moses will be available to the oil finding activities of Jersey Standard and its affiliates in this country, South America and Canada. His headquarters will be in New York. Ruth, a veteran of 26 years with Carter, began his Carter service as a magnetometer operator in 1926 near Duncan, Okla. In 1931 he became a member of the first seismograph crew placed in the field by Carter and later served in the Scouting and Land department and became manager of the Northwest Division at Billings, Mont. He was made head of the Land department in 1946 and became exploration manager in 1947.

•

L. S. Collins, a veteran of 37 years with The Carter Oil Company, was elected a vice president of the company. Collins, who began as bookkeeper with Carter in Tulsa in 1916, became assistant chief accountant three years later, served 20 years as comptroller and has been a director since 1940. A native of Newburgh, Ind., Collins finished high school at Evansville, Ind., and attended Oklahoma A. & M. College, Stillwater.



L. S. Collins

•

Transfers and Promotions . . .

Humble Oil & Refining Company personnel changes in the Production department include: **Douglas E. Acosta,** from parti-time driller, Louisiana Division, to full time rotary driller in the Grand Isle District; **Autry E. McMillan,** assistant district chief clerk, from Kelsey to Potash District, Louisiana Division; **James W. Whitener,** to farm boss at government wells; **Monroe R. Wolters** from assistant division civil engineer, East Texas Division, to the Houston office Civil Engineering Division for a one-year training assignment; **G. O. Howard,** petroleum engineer, from Tyler division office to Talco district as district petroleum engineer; **C. S. Yust,** toolpusher, California area, to Lovell Lake District, Gulf Coast Division; and **Woodrow W. Bain,** district civil engineer, from Mallalieu District, to the Gas Construction Division, Houston.

General Petroleum Corporation transfers among Exploration personnel in California include **J. H. Casey,** district geologist from Santa Maria to the Ventura Basin District; **R. G. Colvin,** formerly assistant geologist at Bakersfield to district geologist for the coastal district with offices at Santa Maria; **C. D. Edwards** to district geologist for the San Joaquin District, replacing **W. D. Lewis.**

Sun Oil Company has announced the creation of several new staff positions and six new divisions within the company's Research and Development department. **Dr. Charles L. Thomas,** formerly manager of the Research Laboratory at Norwood, Pa., will be associate director of the department in charge of all line activities. Assistant directors will be **Norman Thompson, John G. Moxey, Jr.,** and **James I. Harper. W. Herman Barcus** is named manager of the new Products Development Division with headquarters at Marcus Hook; **Earl M. Honeycutt** will manage the Process Development Division at Marcus Hook; **Dr. Robert M. Kennedy** is manager of the Basic Research Division with headquarters at Norwood, Pa.; **Stewart S. Kurtz, Jr.,** is named manager of the Analytical Division; **William A. Casey** will manage the Technical Service Division at Marcus Hook; and **J. Harold Perrine** named manager of the Administrative Division.

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OF OIL COUNTRY PIPE

AGAINST PARAFFIN or CORROSION

In 10 years, the busy Tube-Kote plant has applied its field-proven TK-2 plastic lining to 7 million feet of tubing for producers, pipe lines, drillers, refineries, and chemical plants.

It Can End YOUR Paraffin Nuisance and Corrosion Troubles

TK-2 ends paraffin accumulation in producing wells. It resists corrosion in wells where ordinary pipe is damaged by gas condensate or sour crude. It is especially practical for wells on packer, high pressure wells, offshore or isolated wells, and for wells with storm chokes. In process and chemical plants it stands up under severe, corrosive conditions.

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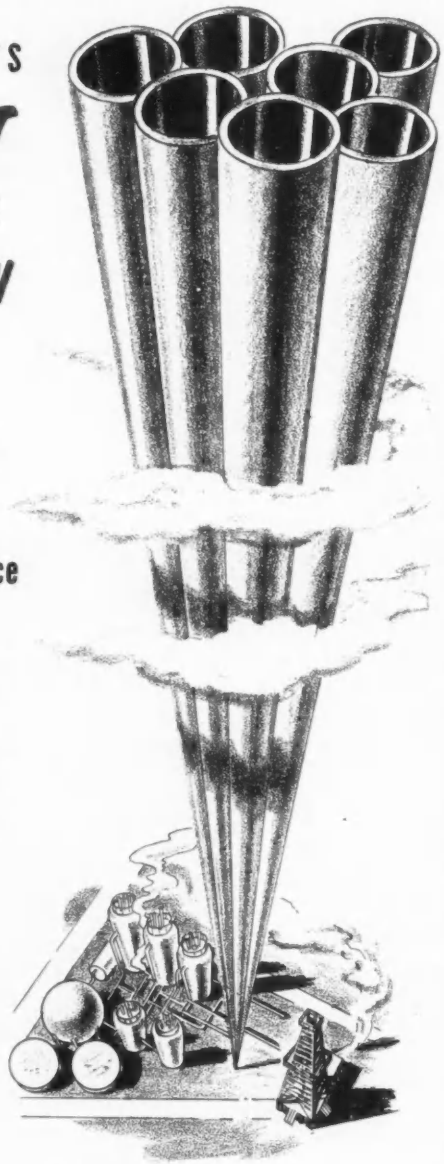

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First Name In Corrosion Resistance

TUBE-KOTE T.M. Reg.

DEATHS

Allen D. Kerr, 64, former district manager in United Gas Corporation's East Texas Division at Marshall, Texas, died June 8 at his home in McAlester, Okla., where he lived since his retirement in March.

•

Michael F. Steil, 83, pioneer Oklahoma oil operator, died July 17. Steil had resided in Tulsa since 1914.

•

Arthur Newlin, 67, prominent in Tulsa business and civic circles, died at his home July 18. Newlin formerly was employed by Gulf Oil Corporation and Sperry Oil and Gas Co., of which he was secretary-treasurer.

•

Owen Fuller Thornton, 36, vice president of the Louisiana Land and Exploration Co., died at his residence in New Orleans, La., on July 15. Thornton held various engineering positions with Tidewater Oil Company, Tulsa, and The Texas Company, Houston, before joining Louisiana Land in March, 1951.

•

George A. Dye, 70, of Tulsa, independent oil operator and former vice president of the Wilcox Oil and Gas Company, died May 25.

•

Warren H. Wynn, 52, district geologist at Oklahoma City for Sinclair Oil & Gas Company, died May 22.

•

William P. Clark of Fort Worth, Texas, independent oil operator, died May 22 at his home.

•

George R. Spinney, 90, of Tulsa, retired independent oil operator, died May 19 in a Tulsa hospital.

•

A. F. Winn, 73, former traffic manager for Skelly Oil Company, died May 18 at his home at Rogers, Ark. He had been with Skelly 22 years before retiring in 1951.

•

Perry J. Sweeny, 61, chairman of the board of directors of Pan American Pipe Line Company, died at Galveston, Texas, May 23.

•

H. M. Reigle, 80, partner of the Richmond Drilling Company, died in Fort Worth July 24. Reigle's first oil field work was near Corduroy, Penn., in 1891. With the late C. S. Richmond, Reigle formed the partnership of the Richmond Drilling Company in 1915.

•

L. E. Delcuze, who at the time of his retirement January 1, 1950, was assistant to the vice president and assistant secretary of Gulf Oil Corporation and Gulf Refining Company Executive Department, Houston, died July 31.

•

Ira A. Smith, 71, retired Tulsa oilman, died August 1. He was manager and local representative of the Tulsa offices of Standard Oil Company of Indiana from 1922 to 1939 when he was transferred to Council Bluffs, Iowa, where he was representative of the company until he retired in 1946.

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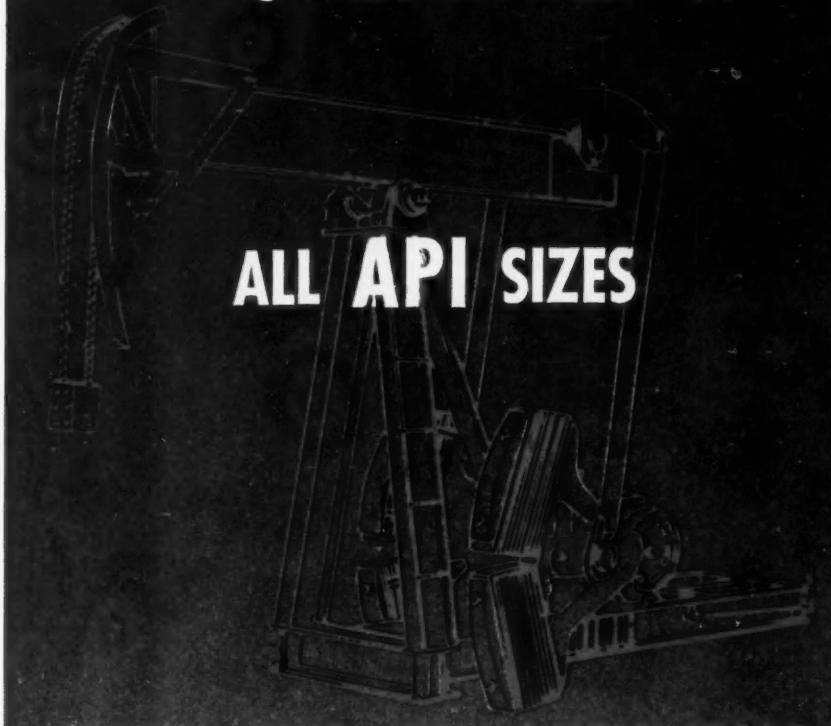

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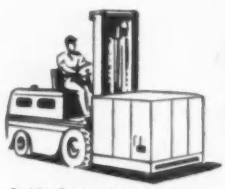
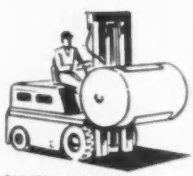
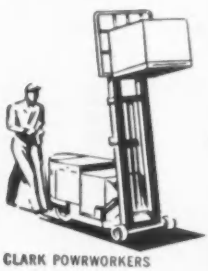


CLARK Electric Fork Trucks



CLARK Attachments



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Companies

IN THE NEWS

MEREDITH AND COMPANY, a Texas corporation to engage in the business of contract drilling for oil and gas and to specialize in handling and developing drilling blocks and farmouts with emphasis on the Gulf Coast area of Texas and Louisiana, has been formed in Houston. **Byron Meredith** is president; **H. E. Dishman,** vice president; and **Earl C. Hankamer,** secretary-treasurer. Offices are in 2117 Commerce Building.

•

CHEVRON OIL COMPANY is being organized as a wholly owned subsidiary of Standard Oil Company of California. Its consulting and prospecting services will be available to the operating companies of the Socal group, which formerly have relied upon geophysical contract companies for their geophysical exploration needs. In addition to performing geophysical work for affiliated companies, Chevron also will provide them with trained geophysical personnel and exploit improvements in methods, techniques, and instruments, resulting from Standard Oil of California's research program. **J. W. Hoover,** formerly vice president in charge of The California Company's Exploration department at New Orleans, heads Chevron Oil Company as president. Other members of the new company are **N. J. Smith,** research geophysicist; **H. E. Stommel,** manager of operations; and **Fred E. Brown,** finance and accounting. Chevron Oil Company has established headquarters at 3800 West Alabama Street.

•

LION OIL COMPANY has announced the removal to Wichita Falls, Texas, of its district land and geological office formerly located at Amarillo, Texas. This office, which handles land and geological matters for the company in the Texas Panhandle and 18 counties of North Central Texas, is attached to the southwestern region which has headquarters at Midland, Texas.

•

MURPHY CORPORATION has opened a district exploration office in Shreveport, La., to assume the functions carried out formerly by the Ark-La-Tex District office located at the company headquarters in El Dorado, Ark. The Shreveport office is located in the Shelby Building and will be in charge of P. T. Landes, Jr., district manager. Others being transferred to Shreveport are Marion C. Buchanan, district landman; R. L. Rogers, Jr., district geologist; Donald W. Allen, landman; J. L. Means, scout; John B. Fatheree, geologist; Michael L. Kidda, geologist; R. McKay Moore, geologist; Miss Mildred Colvin, draftsman; and Miss Wilda McGough, receptionist.

•

PARKHILL TRUCK CO. of Tulsa, Okla., oil field hauling and pipe line stringing concern, has been purchased by **Kenneth A. Owen, Trap Briscoe** and **Howard S. Lipp,** who have organized under new management with Owen as president and Briscoe and Lipp as vice presidents. **Roy F. Parkhill,** founder of the company, will remain with the new company for a brief time in an advisory capacity.

Web Wilson 75- and 125-ton *Hydra Hooks*

Famous Web Wilson "Dash Pot" Action
Full 7" Spring Travel
Fewer Parts, Less Maintenance
Shorter Length, Streamlined Design
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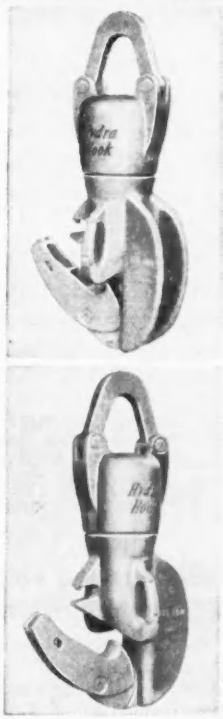

The new 125-ton Hydra Hook was shown for the first time at the 1953 I.P.E. in Tulsa—after having been field tested for over a year. It combines the outstanding features of the "Field Proven" Web Wilson Connector Hooks with many improvements, such as: the elimination of a top bearing; a completely packed off body, to prevent oil leakage and keep the dash pot action at peak performance. It's a full 8" shorter and 1,200 lbs. heavier than its predecessor. A dream in streamlining, its additional weight and perfect balance make even the lightest traveling blocks fall *fast* and *true*.

AVAILABLE NOW—the 75-Ton and 125-Ton
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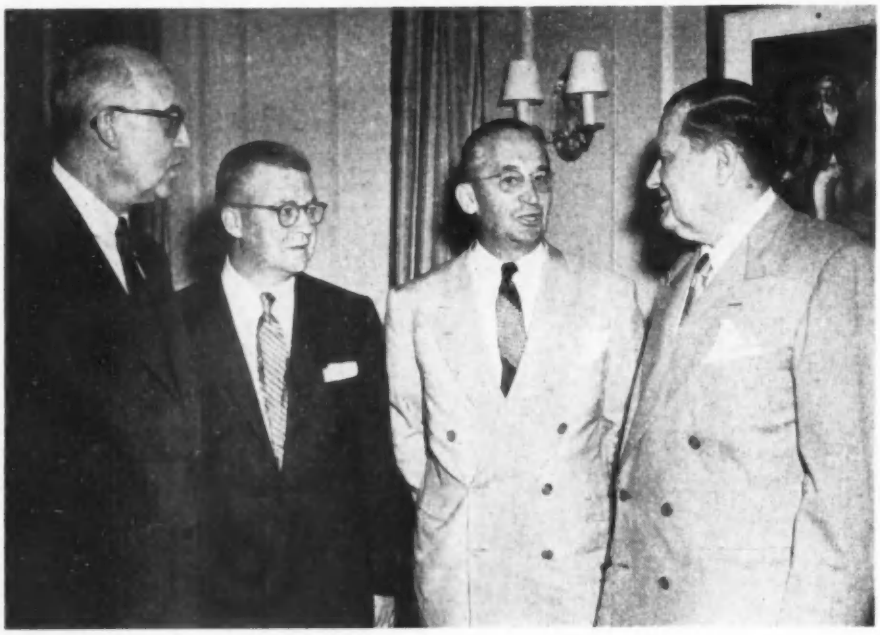
What's Happening

AMONG INDUSTRY ASSOCIATIONS



Oil Men Honor Joseph A. LaFortune

The recently appointed Deputy Petroleum Administrator for Defense, Joseph A. LaFortune, third from left, was honored in New York at a luncheon given by Walter S. Hallanan, chairman of the National Petroleum Council. Top executives of the oil industry in the New York area who are members of the Council were guests. Left to right are R. Rae Jackson, assistant deputy administrator, Petroleum Administration for Defense; H. P. Reynolds, assistant deputy administrator and general counsel; LaFortune and Hallanan.

Desk and Derrick Club Establishes Scholarship

A $200 annual scholarship available for one girl each year in graduate work in petroleum industry subjects at Southern Methodist University, Dallas, Texas, has been announced as a project of the Desk and Derrick Club.

The scholarship will be based on two semesters study per year and will be administered through cooperation of the SMU scholarship board. Studies in geology, petroleum engineering, oil and gas law, or chemistry will be applicable. A permanent scholarship committee composed of Lee Wood, chairman; Maurine Miller, Frankie Frensley, Irene Rathbun and Evelyn Bundurant has been set up.

Atlantic Refining Company Announces Scholarships

Fourteen universities and colleges have accepted awards for fellowships or scholarships offered by The Atlantic Refining Company to encourage outstanding undergraduate and graduate students in the study of techniques connected with crude oil production.

The studies will be carried on in a department of geology, geophysics or chemical, petroleum, mechanical or electrical engineering of the various institutions. Each university and college will recommend a student as the recipient. Fellowships have been accepted by Washington University, St. Louis; and Rice Institute, Houston.

Scholarships have been awarded to the University of Texas, Austin; Southern Methodist University, Dallas; Texas A & M College, College Station; Texas Technological College, Lubbock; University of Oklahoma, Norman; Tulsa University, Tulsa, Okla.; Louisiana State University, Baton Rouge, La.; New Mexico School of Mines, Socorro, N. M.; Ohio State University, Columbus, Ohio; Georgia Institute of Technology, Atlanta, Ga.; Colorado School of Mines, Golden, Colo., and St. Louis University, St. Louis.

Panhandle Geological Officers Announced

Officers of the Panhandle Geological Society elected at a meeting in Amarillo, Texas, are Arthur H. Petsch, Ohio Oil Company, president; Paul H. Horn, Sun Oil Company, vice president; Walter B. Blackmon, Gulf Oil Corporation, secretary; and W. H. Fitzgerald, Continental Oil Company, treasurer.

AIEE Meeting To Feature Petroleum Sessions

Special emphasis on uses of electric power in the petroleum industry will be given on the technical program at the fall general meeting of the American Institute of Electrical Engineers in the Hotel Muehlebach, New York, November 2-6. C. G. Rousch, Kansas City manager of Westinghouse Electric Corporation, is general chairman of the meeting.

Gulf Coast Section SEPM To Be Established

A steering committee has been formed to establish a Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists. Temporary officers of the steering committee include Stuart A. Levinson, chairman; Charles W. Stuckey, vice-chairman; Fred L. Smith, Jr., vice-chairman; Jack O. Colle, secretary; Frank V. Stevenson, treasurer, and Morton B. Stephenson, vice-treasurer.

A petition requesting authorization of the section has been submitted to the council of the S.E.P.M. and if approved, it is planned that active organization of the section will begin in the near future.

The primary objective of the Section is to promote the science of stratigraphy in the gulf coastal states by stimulating research in paleontology and sedimentary petrology, especially as these sciences relate to petroleum geology.

The section will cooperate with the Association of Gulf Coast Geological Societies and local geological societies by presenting paleontologic, stratigraphic and petrologic papers, assisting in the preparation of field trips, and cooperating in outside activities.

IPAA Headquarters Building To Be Constructed in Tulsa

Construction of a modern one-story office building to house the national headquarters of the Independent Petroleum Association of America is under way in Tulsa. Hannaford Construction Company, Tulsa, will build the contemporary styled structure which is expected to be ready for occupancy by January.

The IPAA building will adjoin on the north the new national headquarters of the American Association of Petroleum Geologists completed recently

A building committee appointed from the IPAA membership to plan the new headquarters was headed by Fred W. Sheild, San Antonio, Texas, a past president of the association. A subcommittee of Tulsans was composed of D. R. Snow, retired Sunray Oil Corp. official, who heads the subcommittee, with F. A. Kirkland of Kewanee Oil Company, and C. E. Buchner, IPAA executive manager.

New Mexico Society Plans Annual Field Conference

The fourth annual field conference of the New Mexico Geological Society will be held October 16-18 in southwestern New Mexico. Registration will be held October 15 in El Paso and early registrants will make a short excursion into the Franklin Mountains near El Paso in the afternoon.

The conference caravan will assemble in Las Cruces October 16 and will disband in the Chiricahua Mountains, Cochise County, Ariz., on October 18. Outcrops of Paleozoic, Mesozoic, and Cenozoic sedimentary rocks in this wildcat province will be visited and emphasis will be placed on the Grant County, N. M., mining districts.

For further information, write P. T. Hayes, secretary of the society, Box 187, University of New Mexico, Albuquerque.

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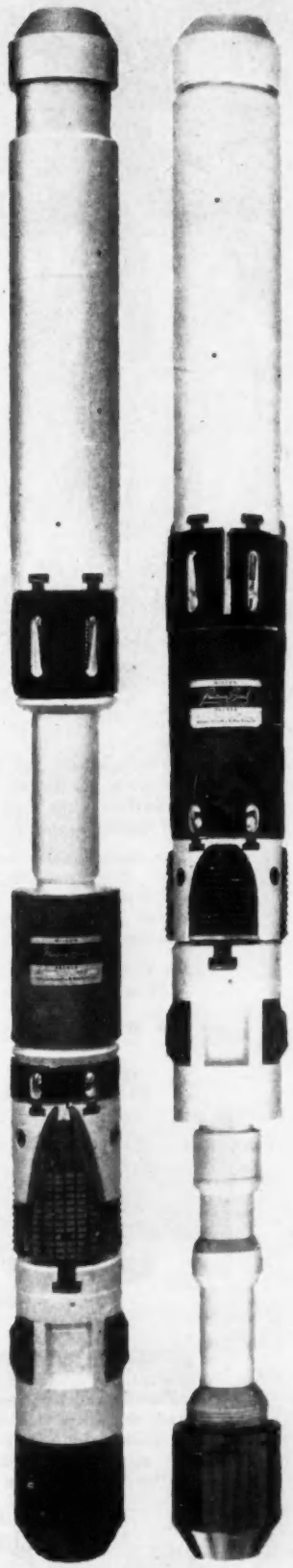
"TWO WAY" METAL BLOCK

HOLD-DOWN PACKER



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When great pressures are applied from "below" the Packer—ordinary Packers, even with Hold-downs, too often fail. Either they fail to hold or the Packer element "cold-flows" upward between the casing and the outside diameter of the tool.

With the New Wilson "Two-way" Metal Block Packer with Hold-down, the element is "trapped" and cannot "cold-flow."

The Hold-down device with its slips is made integral with the upper packer mandrel. In the running in position the hold-down slips are retracted.

In setting the packer the lower slips are set first by rotating the tubing and setting down. The Hold-down slips are then set by pressure from the tubing acting upon an annular ring piston located inside the mandrel. The slips, giving full 360 degree contact in the casing, absolutely prevent any upward extrusion of the packer element because of pressure from below the packer. The packer element, in the "set" position, abutts the lower end of the Hold-down slips. The best method for pulling the Packer is to equalize tubing and casing pressures, which will release the Hold-down slips. However, in the event that such equalization is not feasible, the Packer may still be pulled in the usual manner since the taper on the slip cone is pulled away from the slip taper as the tubing is raised.

The opening through the entire packer, and Hold-down slip mandrel, is full tubing size.

All packers available with Automatic Bottom.

This is an outstanding development in Packer design and construction. It will save you time and money to run the Wilson Type "MB," Metal Block, Hold-Down Packer.

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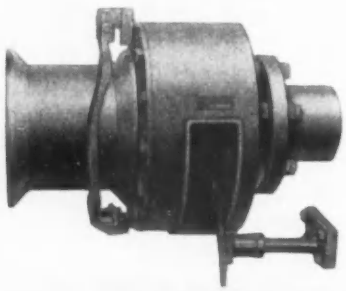
The control lever delivers from zero to 40 lbs. pressure during the first 60° of travel. The remaining 30° of movement increase and control the pressure from 40 to 100 lbs. This arrangement controls pressure with critical accuracy in the lower range and provides adequate power for maximum line pull.

For complete details of Foster Air Controlled Catheads see pages 1758, 1759 and 1769 in the Composite Catalog.

AIR SPINNING CATHEAD



AIR MASTER BREAKOUT CATHEAD

PLUS FEATURES of the Air Master Breakout and Air Spinning Catheads: Precise control ● no adjustments ● direct diaphragm actuated ● instant disengagement ● crawl-free drum ● fully enclosed ● quick change jerkline ● peak performance. The Air Master Breakout has a triple plate clutch; the Air Spinning Cathead, a single plate friction clutch for line pulls up to 12,000 lbs.

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Rotary Sales & Service, Ltd., Edmonton, Alberta, Canada
Woodco Sales & Service, Great Bend, Kansas
W. O. Nelson, Farmington, N. M.

Roy F. Carlson Joins API Production Division

Roy F. Carlson has joined the staff of the Division of Production of the API in Dallas as assistant to the director. Carlson will be in charge of the division's drilling and production practice programs and district activities.

Roy F. Carlson

A graduate of the Colorado School of Mines, Carlson has been a member of the editorial staff of the *Oil & Gas Journal* since 1948, his most recent post being West Texas editor for the publication. Prior to his affiliation with the *Journal*, Carlson was employed by Phillips Petroleum Company.

Nugent Named Chairman Of Geophysicists Meet

R. M. Nugent, Magnolia Petroleum Company, Midland, Texas, has been appointed general chairman for the seventh annual Midwestern Meeting of the Society of Exploration Geophysicists. Co-chairman is L. H. Johnson, Honolulu Oil Corporation, Midland, Texas.

Plans are under way for the two-day meeting of oil exploration scientists at the Adolphus Hotel, Dallas, Texas, November 12 and 13. The meeting is sponsored jointly by the Dallas, Shreveport, Fort Worth, Tulsa, Oklahoma City and Midland sections of the SEG. The Permian Basin Geophysical Society, Midland section of the SEG, and the Dallas Geophysical Society are the host groups for this year's meeting with members of the Midland section in charge of all arrangements.

Tri-State Desk and Derrick Organized in Indiana

The Tri-State Desk and Derrick Club has been organized in Evansville, Ind., with members from Evansville and Washington, Ind.; Grayville and Mt. Carmel, Ill., and Henderson, Ky. The group has 80 members.

Officers are Olivia Starken, president; Anne Bollinger, vice president; Yvonne Ohning, recording secretary; Jean Greinke, corresponding secretary; and Mae McQueen, treasurer. Directors elected were Irene Holsen, Aladia Meier, Esther Cunningham, Margaret Donahue and Betty McNeeley.

Consulting Engineer Offers Corresponding Courses

Marshall E. Parker, consulting corrosion engineer, M & M Building, Houston, is offering guided study correspondence courses in cathodic protection. Designed to interest owners and management of facilities including underground structures such as piping and pipe lines, the courses are adapted to the abilities and needs of individual students. Guidance in selection and use of instruments is included.

Emphasis is on individual adaptation and on guidance in the actual conducting of surveys, design and installation of protective systems. Descriptive literature regarding the courses is available on request.

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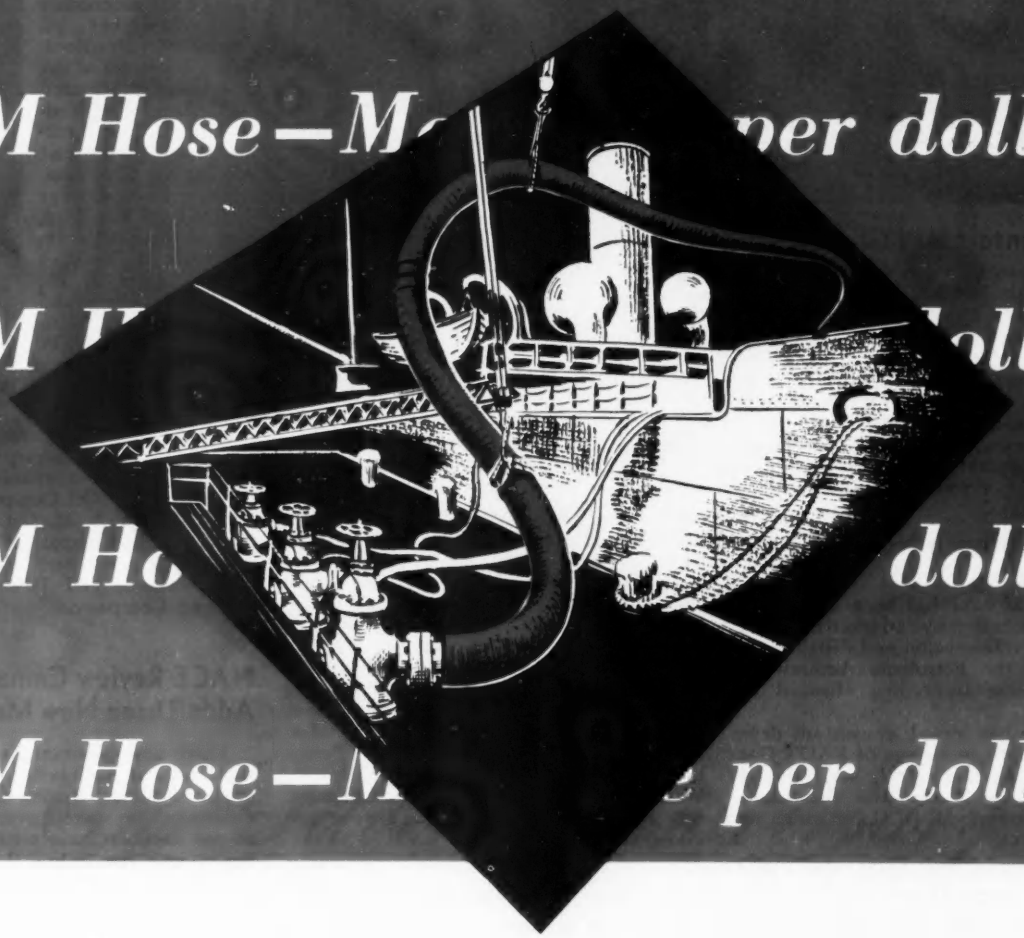

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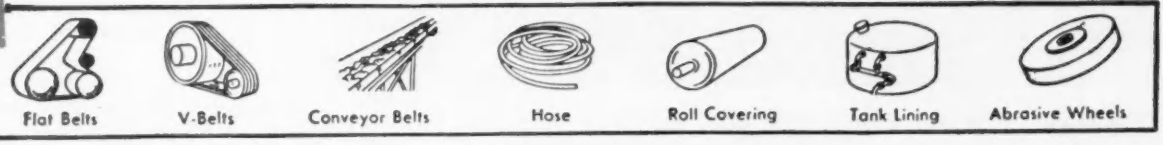

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Teflon Products • Packings • Sintered Metal Parts • Bowling Balls

Rocky Mountain API Group Elects Officers

J. Howard Barnett, consulting engineer, Casper, Wyo., was elected chairman of the Rocky Mountain District, API, Division of Production, at the close of the spring meeting in Casper. Other officers elected were, left to right, William M. Schul, Phillips Petroleum Company, Cut Bank, vice chairman for Montana; E. N. Dunlap, California Company, Denver, vice chairman for Colorado; Barnett; J. S. Leonard, The Ohio Oil Company, Sidney, vice chairman for Nebraska; A. F. Barrett, Billings, outgoing president and chairman of the advisory committee; and T. A. Atkinson, Socony-Vacuum Oil Company, Casper, vice chairman for Wyoming. Not present were H. C. Scoville, U. S. Geological Survey, Salt Lake City, vice chairman for Utah; O. C. Arnold, Amerada Petroleum Corporation, Williston, vice chairman for North Dakota; and Walter F. Forbes, Ken Corporation, Casper, secretary-treasurer.

PAD's Gas Branch Names Morton Acting Head

Oscar W. Morton has been appointed acting assistant deputy administrator in charge of gas transmission and distribution operations in the Petroleum Administration for Defense succeeding Howard B. Noyes.

Noyes, who has served as assistant deputy administrator in charge of PAD's Gas Branch since April 1, 1952, has resigned to return to the Washington Gas Light Company, Washington, D. C., of which he is vice president.

API Production Division Names Pacific Coast Officers

Milan G. Arthur, Union Oil Company of California, Los Angeles, was elected chairman of the Pacific Coast District, API, Division of Production, at the annual meeting held in Los Angeles. Arthur succeeds T. H. Acres of Sunray Oil Corporation, Los Angeles.

Other Pacific Coast district officers elected were J. T. Ledbetter, vice chairman, Los Angeles Basin, Union Oil Company of California, Whittier, Calif.; G. V. Kersten, vice chairman, South San Joaquin Valley, Western Gulf Oil Company, Bakersfield, Calif.; Watt Lupton, vice chairman, coastal area, Shell Oil Company, Ventura, Calif.; Jack Lemley, vice chairman, Coalinga-Kettleman, Standard Oil Company of California, Avenal, Calif.; Charles T. Reichert, treasurer, National Supply Company, Torrance, Calif.; Mrs. Elsie Edmiston, secretary, American Petroleum Institute, Los Angeles. Lot Bowen, Western Gulf Oil Company, Los Angeles, was elected chairman of the district advisory committee.

Moshier Is Appointed To AGA Operating Section

Fredric Moshier, formerly assistant to the director of the Natural Gas department of the American Gas Association, has been appointed assistant secretary of the A. G. A. operating section. In this capacity he will assist in coordinating the activities of the natural gas branch of the industry into the programs of the operating section in accordance with the revised A. G. A. constitution and by-laws.

Class Makes Field Trip

University of Texas petroleum engineering students recently completed a field trip which included visits to East Texas oil field installations.

Chipman Heads Pennsylvania Grade Crude Oil Association

Charles A. Chipman, oil producer of Bolivar, N. Y., has been elected president of the Pennsylvania Grade Crude Oil Association succeeding C. E. Streeter, oil producer of Bradford, Penn. Directors of the association also elected A. C. Simmons, Bradford oil producer, second vice president succeeding Chapman. Reelected were George J. Hanks of Bradford, first vice president; Fayette B. Dow of Washington, D. C., vice president and general counsel; Samuel Messer, Oil City, Penn., treasurer; F. W. Alcorn, C. G. Johnson and C. L. Suhr of Oil City, assistant treasurers; and W. C. Wenzel, Oil City, executive manager.

C. A. Chipman

Former vice president and director of the organization, Chipman is a partner in the following oil companies: Reynolds and Chipman, Star Oil Company, Victory Oil Company, W. A. M. Oil Company, H. J. Reynolds and Company, Hickory Oil Company, Chipman and Herrick, Reynolds and Reeland, and Petre and Amesbury Drilling Company.

NACE Review Committee Adds Three New Members

Three new members have been added to the National Association of Corrosion Engineers Editorial Review Committee, a new chairman has taken over and two committee members have retired. The committee reviews the technical manuscripts submitted for publication in Corrosion, the association's monthly magazine.

New members are I. C. Dietze of the Department of Water and Power, City of Los Angeles; J. J. Harwood, Office of Naval Research, Washington, D. C., and V. B. Pike, Bell Telephone Laboratories, Murray Hill, N. J. The new chairman, Thomas P. May, member of the committee for many years, succeeds George Diehlman of National Lead Company, New York. F. N. Alquist of The Dow Chemical Company, Midland, Mich., is the other retiring member and formerly was committee chairman.

National Safety Congress Meets Oct. 19-23 in Chicago

Sessions of interest to safety men in all branches of the petroleum industry will be presented at the 41st National Safety Congress and Exposition in Chicago October 19-23. After the general meeting the opening day, five sessions designed to provide safety information in production, pipe line, manufacturing, marketing, and exploration and drilling operations will be presented.

Accident prevention equipment displayed will include products, equipment and services relating to the promotion of safety, health, first aid, sanitation and general welfare.

Our Silver Anniversary

Climaxing 25 Successful Years of Partnership with You

Yes . . . we are celebrating the Silver Anniversary of our partnership with you of the petroleum industry. To our way of thinking, it has been a valuable twenty-five years for you as well as us . . . and we are proud to have been able to bring LOW-COST ELECTRICAL POWER to so many organizations in all phases of the petroleum industry. Oil men everywhere are invited to attend our Silver Anniversary meeting at Hotel Muehlebach in Kansas City, Mo., October 5, 6 and 7. Come and bring your power problems with you . . . because this is a meeting not for appraisal of past accomplishments but for planning more and better ways of providing the petroleum industry with EFFICIENT LOW-COST ELECTRICAL POWER. See you in Kansas City.

Welcome

- OIL MEN
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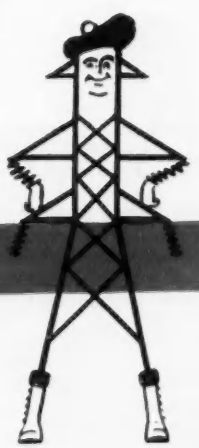
- ALLIED SUPPLIERS
- OIL JOURNALS and PRESS



Petroleum Electric Power Association

ORGANIZED IN 1928 IN THE INTEREST OF
GREATER SERVICE TO THE PETROLEUM INDUSTRY

P. O. Box 2771, Dallas, Texas

What's Happening

AMONG SERVICE AND SUPPLY MEN

MARINE BULK MUD is delivered in the Louisiana-Gulf Coast area by this new completely electrified barge.

Barge Delivers Bulk Mud To Marine Drilling Rig System

A new 110-foot barge which will render a marine bulk mud service in the Louisiana Gulf Coast area for all marine drilling rig systems equipped to receive bulk mud is being used by the Mud Supply Company of Lake Charles, La.

According to Sonny Harris, vice president of the company, this development is the first of its kind and is completely electrified. Recently delivered by the Equitable Equipment Co. Inc. of New Orleans, the barge is capable of delivering the mud to the rig faster than the receiving point on existing rigs can take it. It can lift the mud vertically over 26 feet, higher than required by any existing rig and handles more than 50 tons per hour. The completely electrified new unit contains its own power plant, all necessary power driven handling gear and is electrically interlocked for sequence operation.

The barge is a 110 feet by 30 feet by 6 feet six inches "Equity" standard deck cargo barge with the necessary bins and housing facilities mounted upon it. This size barge is reported to be ideal for operations on inshore canals, bayous, and bays, and is readily adaptable for general use in the open gulf.

The designing of the rig is credited to the cooperative effort of K. E. Brown, chief project engineer of Magnet Cove Barium Corporation, Sonny Harris, vice president of Mud Supply Company, and the Shipbuilding Division of Equitable Equipment Co.

Trane Company Announces Personnel Appointments

The Trane Company, La Crosse, Wis., manufacturer of air conditioning, heating and ventilating equipment, has announced the appointment of Roy L. Smith to the Philadelphia sales office, and the return of James J. Callahan to the Newark, N. J., sales office after a tour of military duty.

Smith has had thirteen years' experience in the air conditioning field in the Philadelphia area. He is a graduate of Carnegie Institute of Technology with a B.S. in mechanical engineering.

Callahan returns to the Newark office after 24 months active duty in the Navy as a commissioned officer. He was originally assigned to Newark after graduating from the Trane engineering class of 1948. Callahan is a graduate of Harvard University with a B.S. in mechanical engineering.

W. H. Brady Company Makes Sales Personnel Promotions

Westley J. Tuite, formerly Chicago district manager of W. H. Brady Company, has been promoted to general sales manager and will have headquarter at the company's main office in Milwaukee.

Westley J. Tuite

Other promotions announced by the company are Fred C. Kluhsman, Chicago district representative; Joseph I. Stone, Eastern district manager; and Paul J. Leonard, Mideastern district representative.

McCullough Tool Company Names Smith to Sales Manager Post

Appointment of Robert W. Smith as eastern division sales manager has recently been announced by McCullough Tool Company.

Robert W. Smith

Smith, born in Eufaula, Okla, served in the U. S. Air Force during World War II. After being discharged in 1945 he resumed his education at Rice Institute, Houston, graduating in 1946.

He joined McCullough Tool Company in the same year as a field operator, later transferring to the Sales department. In 1950, Smith was appointed eastern division public relations director, a position he has held until his new appointment as sales manager.

Smith will continue to work out of the McCullough eastern division headquarters at Houston. He will assume management of sales immediately over the 25 McCullough eastern division branches located in Texas, Arkansas, Kansas, Louisiana, Mississippi, New Mexico and Oklahoma.

Graver Water Conditioning Promotes A. H. Honeck

A. H. Honeck has been named district manager in Cleveland and Cincinnati by Graver Water Conditioning Company.

Honeck has worked in various departments at the Graver main office in New York City as a design, estimating and sales engineer since 1951. Prior to his connection with Graver, he was a research and development engineer, following several years as a plant engineer.

In his new appointment, Honeck's experience will be available to engineers in his district for solving water treatment problems. He will maintain an office in Cleveland at 1103 Citizen's Building, and in Cincinnati at 3427 Corrine Ave., and his territory will include the entire state of Ohio and the northern counties of the state of Kentucky.

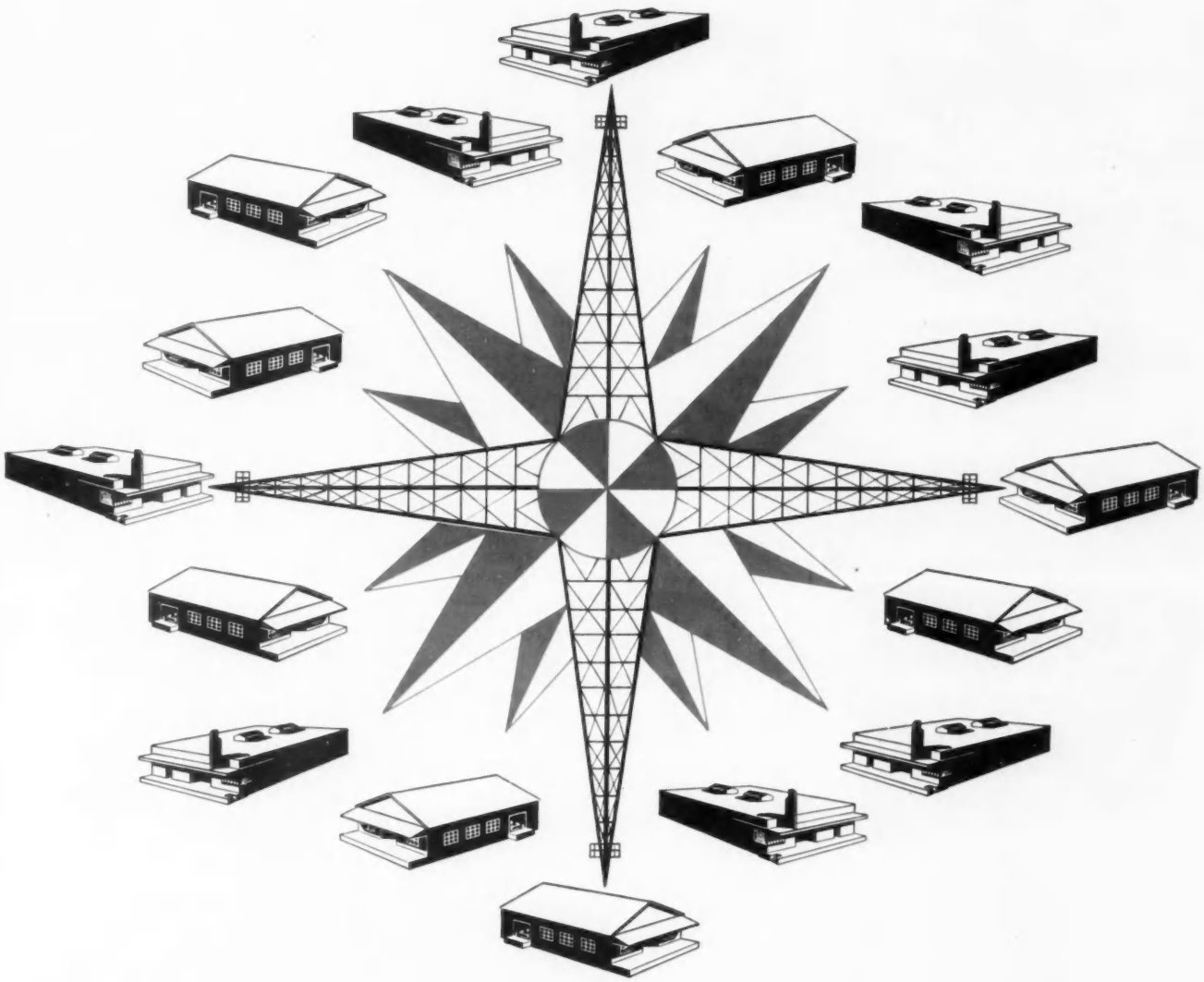
Dowell Appoints Ray Wagner Assistant District Manager

Ray R. Wagner has been appointed assistant district manager for Dowell at Oklahoma City. He will be responsible for maintenance, safety, employee relations and purchasing.

Wagner, a graduate of Kansas University, joined Dowell at Seagraves, Texas, in 1940 as an equipment operator. He has been a junior service engineer and service engineer in West Texas, and a mechanical engineer and maintenance engineer, maintenance supervisor and development engineer in Tulsa. In 1950 he was transferred to Midland, Texas, as assistant manager.

At Every Point of the Compass

YOUR SUPPLY STORE IS AT YOUR SERVICE



For the vast inventory it places at your disposal . . .

For the services it renders every day, twenty-four hours a day . . .

For the economies and conveniences it thereby effects for you . . .

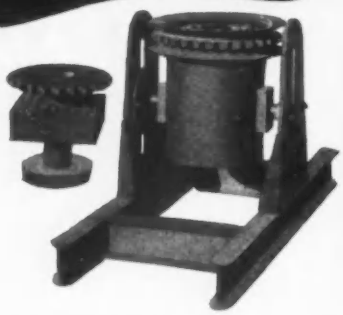
Your Supply Industry deserves your full support. There are many sound reasons for purchasing all your requirements " . . . THROUGH YOUR SUPPLY STORE."

LARKIN

. . . Through Your Supply Store

LARKIN PACKER COMPANY, INC., ST. LOUIS, MO.

Gets you off to a Fast Start



The improved BEMCO Rathole Digger usually gets your ratholes dug in less time than it takes to move and re-set your rotary table. Available in three sizes, for digging ratholes up to 13", BEMCO Rathole Diggers are furnished with drive bushings to fit your regular kelly joints.

Get the full story on this faster, safer, more economical method of digging ratholes. One Digger will serve a number of rigs in the same area.

L&H MACHINE WORKS
2205 Quitman Houston, Texas
EXPORT: Baird Supply Co., Inc.
420 Lexington Ave., New York, N. Y.

BUSINESS and Pleasure in TULSA means-

- AIR-CONDITIONED COMFORT
- CENTRAL LOCATION
- CONVENIENT COFFEE SHOP
- NEW MODERN ADJOINING GARAGE

THE MAYO
TULSA'S FINEST HOTEL
Home of the Popular Terrace Room

H. C. Smith

New Giant Size Hole Opener Added to H. C. Smith Line

The 36-inch three-point hole opener shown above is reported to be one of the largest ever built. It is a new addition to the line of three-point and six-point hole openers manufactured by the H. C. Smith Oil Tool Company of Compton, Calif.

H. C. Smith, president of the company, holds up one of the company's regular 3⅞-inch four-cutter bits to emphasize the dimensions of the new opener. Like other hole openers in the H. C. Smith line, the 36-inch hole opener is supplied with either a bull nose pilot bit, as shown in the photograph, or with a rock bit pilot.

Schlumberger Opens Office In Fullerton, California

Fullerton, Calif., is the site of a new field office recently opened by the Schlumberger Well Surveying Corporation. The office is located at 4129 West Commonwealth Ave. and will provide services for inland fields of the Los Angeles Basin.

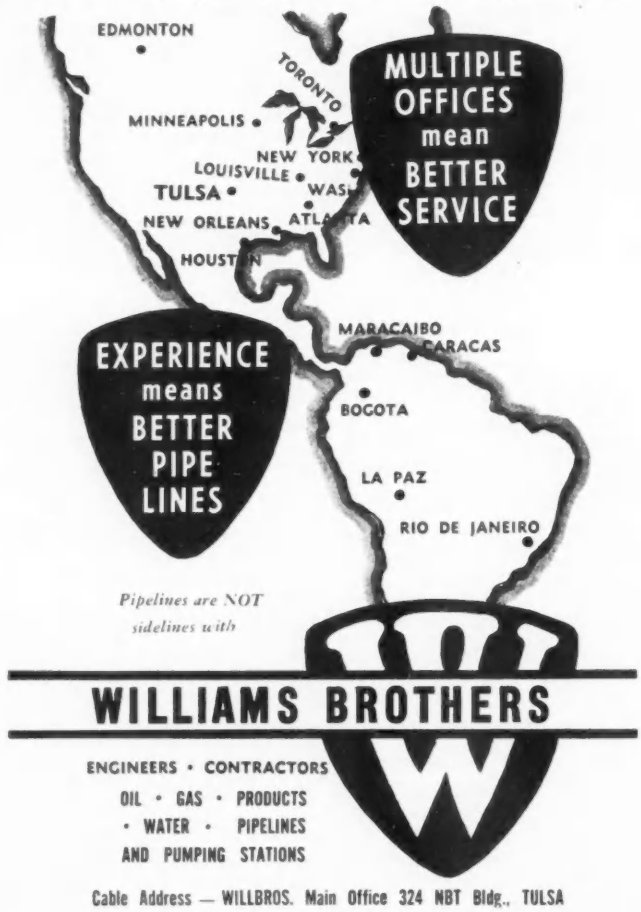
Charles C. Arnold

The new office will be under the management of Charles C. Arnold, a mechanical engineering graduate of the University of Illinois. He joined Schlumberger in 1948 as a field engineer and has worked in the Long Beach, Bakersfield, and Coalinga district offices.

National Supply Opens New Store in Colorado

The National Supply Company has announced the opening of a new store at Fort Morgan, Colo. This latest oil field supply outlet will enable the company to better serve operators in the southern and western portions of the Denver-Julesburg Basin.

The Fort Morgan store comes under the supervision of C. L. Bainter, National Supply's district manager, Denver. The store is under the direction of B. R. Hibdon, store manager. Field salesmen are J. L. Grant and R. L. Arnold.



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ENGINEERS • CONTRACTORS
OIL • GAS • PRODUCTS
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AND PUMPING STATIONS

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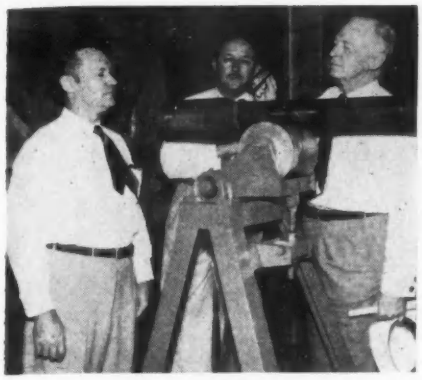


Officials Inspect Tool Joint

Reed Roller Bit officials inspect a newly-welded Reed tool joint, flash welded to drill pipe at the company's new plant addition in Houston. Left to right, H. C. Tooley, vice president—manufacturing; H. B. Book, manager of Reed's export sales division; and R. G. Hamaker, vice president—sales.

Physicist Joins Well Surveys As Technical Director

Dr. John H. Buck has joined Well Surveys, Inc., Tulsa, as technical director.

Born in England, and reared in Saskatchewan, Canada, Buck received his Ph.D. in physics in 1938 at the University of Rochester, Rochester, N. Y. He was an instructor in physics at Massachusetts Institute of Technology for three years assisting also in design, construction, and use of the M.I.T. cyclotron in research on proton induced radioactivities. During the war years he was active in the application and use of radar in both the European and Pacific theatres.

Buck was head of the Physics Division of Socony-Vacuum Oil Company's Paulsboro Laboratory in New Jersey for four years and was thereafter engaged by the U. S. Atomic Energy Commission at Oak Ridge, Tenn.

Hyster Company Names Hill Vice President

Election of Philip S. Hill to vice president in charge of all sales by the Hyster Company board of directors has been announced. Hyster operates factories at Peoria and Danville, Ill.; Portland, Ore,; and Nijmegen, The Netherlands.

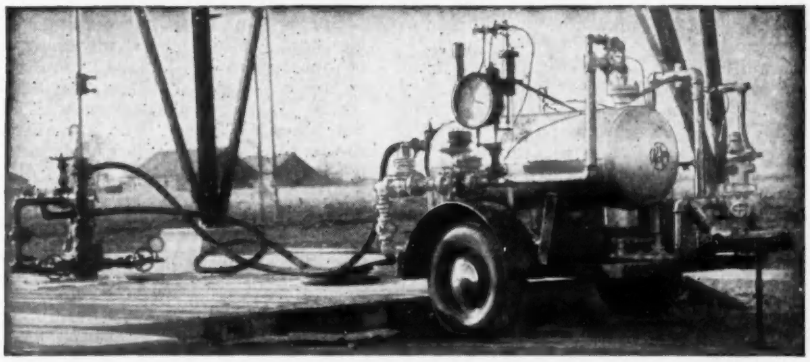
Hill's election to the newly created post is in line with increased sales activities in recent years due to modern demands for materials handling equipment, tractor and logging tools. Hill has been general sales manager for the past several years. With the company for more than 20 years, he was at one time eastern division sales manager. For several years he managed the Washington, D. C., office. At present Hyster's sales activities cover 58 countries.

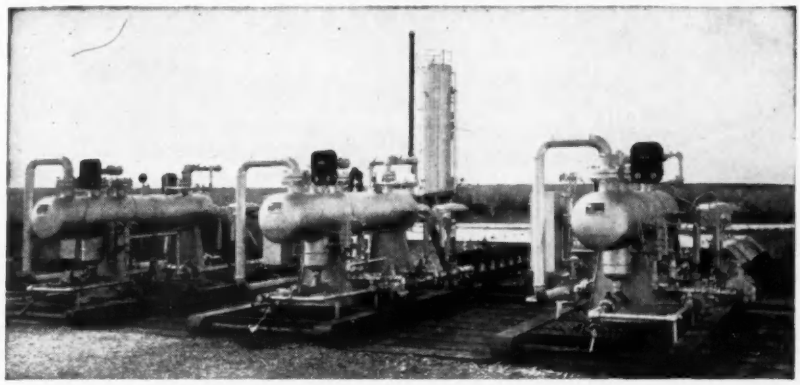
Lee C. Moore Corporation Transfers Branham to Midland

Donald R. Branham has moved from Tulsa to Midland, Texas, where he will be assigned to the Sales and Service department of Lee C. Moore Corporation, working out of the company's Odessa office.

Branham started with Lee C. Moore Corporation during high school vacations in 1948, and until recently was in the company's Engineering department, Tulsa.

WELLCHECKERS





by ROLO give you accurate production records on your wells

PERMANENT AND PORTABLE WELLCHECKERS BY ROLO separate your well fluid into three phases of oil, gas and water, and meter each accurately. This enables operators to check well production daily, and secure accurate tax and royalty records.

Made in various sizes and working pressures to fit any operation, the installations shown above are typical of the many Rolo Wellchecker units now in use throughout the industry.

Rolo Wellcheckers are shipped completely piped and ready to operate. You need only connect inlet and outlet. In addition to oil meter, B. S. & W. sampler, gas run, orifice meter, fittings and all controls, free water knockout with meter can be furnished to separate and continuously remove free water from well fluid.

Write today about your well testing and oil metering requirements, and let us work with you on your problems.

Ask for illustrated Catalog W-52, with complete description of all Wellchecker units, made only by Rolo.

Crude Oil Metering Specialists

ROLO MANUFACTURING COMPANY

P. O. BOX 6763, HOUSTON 5, TEXAS

BRANCHES: Corpus Christi, Midland, Kilgore, Tulsa, New Orleans, Los Angles, Bakersfield, Casper, Calgary (Alta.).
Petroleum Industry Consultants, Apartado 3992, Caracas, Venezuela
EXPORT OFFICES: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

Mid-Continent Supply Opens Division Offices in Canada

Mid-Continent Supply Company has opened division offices and is building a new store in the province of Alberta, Canada. Division offices have been opened in the Blow Building in Calgary and construction of the new store in Edmonton is underway.

Transferred to Calgary as division manager is R. L. Harris. Accompanying him is G. A. Metz, division machinery manager. C. W. Crabtree, manager, has been supervising construction in Edmonton. All three were formerly located at Casper, Wyo.

Mid-Continent has transferred A. T. Skaer, former assistant division manager, from Tulsa to Denver as division manager. Skaer will have charge of stores and locations in Casper and Thermopolis, Wyo.; Williston, N. D.; Glendive, Mont.; and Sterling and Denver, Colo.

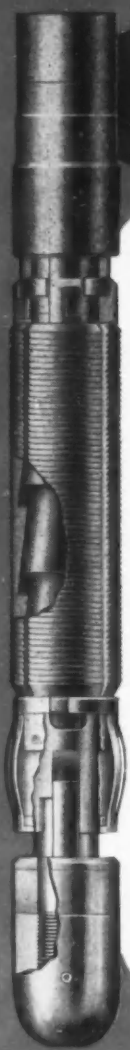
Sperry-Sun Well Surveying Firm Opens Canadian Subsidiary

Sperry-Sun Well Surveying Company, Houston, has announced the establishment of Sperry-Sun of Canada, Limited, with offices in Calgary, Alberta, Canada. Quentin B. Marsh, who has been with Sperry-Sun since 1948, has been appointed vice-president of the Canadian subsidiary.

Sperry-Sun of Canada has its offices at 5240-1A Street, S. E., and the mailing address is Sub Post Office No. 28, Calgary, Alberta. The Canadian Company provides complete well surveying services.

FULL CIRCLE TYPE BOWEN RELEASING SPEARS

Offer Many Outstanding Advantages



Full Circle Type Bowen Releasing Spear for casing

Safety Ring Pack-off

SECURE ENGAGEMENT— Comparisons show that this Spear has from 35% to 45% more useful slip engagement area than any other spear on the market today! There is no loss of engagement regardless of the degree of the upward pull and regardless of the intensity of the jarring blows. On numerous actual jobs, in conjunction with hydraulic pulling tools and jars, pipe has been pulled and jarred in two below the Full Circle Type Bowen Releasing Spear with no distortion at the point of engagement.

POSITIVE RELEASE — Full Circle Type Bowen Releasing Spears provide means for hanging and supporting the Full Circle Slips in their uppermost position relative to the spear body. Full Circle Spears can be engaged with and released from a fish indefinitely without being withdrawn from the hole. The releasing mechanism is unaffected by excessive pulling strains, terrific jarring blows, and adverse well conditions.

VERSATILITY and SAFETY — All Full Circle Type Bowen Releasing Spears can be equipped to pack off the fish simply by removing the Safety Ring and by installing in its place a Safety Ring Pack-off.

All Full Circle Type Bowen Releasing Spears for Casing are engineered to provide greater tensile strengths than the tensile strengths of the pipe sizes that they engage.

The Full Circle Slips encompass so much of the inner area of the fish that it is virtually impossible for any junk to fall alongside and foul the mechanism of the Spear. The Full Circle Slips are designed to collapse below the outside diameter of the Safety Ring or the Safety Ring Pack-off. This feature insures the Spear ability to release from any fish that it has penetrated.

Available in tubing and drill pipe sizes as well as in casing sizes.

Write for descriptive literature

ECONOMY — Because Full Circle Spears do not distort the fish, there is no movement under strain of the spear within the fish and the Full Circle Slips can be subjected to great pulling and jarring strains with no wear whatever. Pipe and liners salvaged by Full Circle Spears are more usable because they are neither split nor distorted. Another time-saving feature is the fact that slips can be changed without removing the Nut from the Body.

SR BOWEN CO

MAIN OFFICE AND PLANT:
11008 SOUTH NORWALK BOULEVARD
SANTA FE SPRINGS, CALIFORNIA
EXPORT OFFICE:
30 ROCKEFELLER PLAZA
NEW YORK CITY, NEW YORK
EXPORT REPRESENTATIVE: VAL R. WITTICH, JR.

Dr. F. B. Porges C. W. Williamson

Flexibox and Sealol Corporation Sign Licensing Agreement

The signing of a mutual licensing agreement between the Sealol Corporation of Providence, its subsidiary, the Sealol Manufacturing Company, and Flexibox Ltd. of Manchester, England, has been announced. Both firms are leading manufacturers of mechanical seals for items from jet engines to refrigerators.

Pictured during his recent trip to the United States is Dr. F. B. Porges, left, managing director of Flexibox Limited, with Clement W. Williamson, right, president of Sealol Corporation.

While Sealol will handle Flexibox sales and service in the U. S., the British firm will do the same for Sealol in the United Kingdom and western European countries.

Aeroquip Buys Ohio Subsidiary Of Sterling Electric Motors

Pressed by the need for additional operating facilities and storage space to handle its growing sales volume and product diversification, Aeroquip Corporation has acquired the plant of Sterling Electric Motors, Incorporated located at Van Wert, Ohio.

The one year old plant, which contains some usable equipment, is ready for immediate occupancy. Situated 100 miles south of Aeroquip's main plant in Jackson, Mich., the 45,000 square foot Van Wert plant, whose replacement value is about $500,000, is located on an 11-acre plot between the Pennsylvania Railroad's New York-Chicago main line and the Lincoln Highway, U. S. 30.

The newly acquired plant offers highly efficient operating facilities which will lower handling charges and permit an improved flow of material as well as enable the company to consolidate different warehouse locations into one easily controlled unit. In addition, Aeroquip is transferring its Cheboygan, Michigan, operations, now occupying leased quarters, to the Van Wert plant.

Sutton Named General Manager Of K&G Oil Tool & Service

W. J. Sutton has been appointed general manager of K & G Oil Tool & Service Company at Houston.

Trained at Oklahoma University, he went to Colombia, South America in 1928, where he was employed as petroleum engineer by one of the major oil companies. On his return to this country in 1938, Sutton went with the Sun Oil Company as petroleum engineer at Conroe, Texas.

During the past 15 years, Sutton has been with the Wilson Supply Company of Houston in charge of the Engineering department.

C. E. Magoon Receives U. S. Steel Appointment

C. E. Magoon has been appointed treasurer, National Tube Division of United States Steel Corporation to succeed H. J. Hirshman, who is retiring after 49 years service with National Tube. Hirshman will remain active in the United States Steel Division in a consulting capacity.

C. E. Magoon

Magoon began his business career in 1924 with Firestone Tire and Rubber Company, St. Louis. He joined U. S. Steel as an auditor in the Pittsburgh general offices of the former Carnegie Illinois Steel Corporation in 1939. After several appointments Magoon was named assistant treasurer in 1944 when Tubular Alloy Steel merged with National Tube Division.

Talley Named Division Manager Of Homco Sales and Service

The Houston Oil Field Material Company, Inc., announces the appointment of L. L. Talley as division manager of sales and service of the West Texas-New Mexico area.

Talley, a long time employe of Homco will have an office in the Western Building in Midland, Texas. Talley will coordinate the activities of stores in San Angelo, Odessa and Snyder, Texas, and Hobbs, Lovington and Farmington, N. M.

Kerotest Manufacturing Names Coe Sales Representative

Russell H. Coe has been appointed sales representative for the Kerotest Manufacturing Company in the northeast section of the U .S. Coe will handle sales of Kerotest valves and fittings to petroleum transmission and refining companies and to industrial firms in the area.

Russell H. Coe

Coe has served as test engineer in the Indiana Harbor Plant of Youngstown Sheet & Tube Company, and as a sales engineer for that firm in seven midwestern states. He later became a vice president of Pipe Line Service Corp., and more recently assisted in organizing the protective coatings division for Pittsburgh Coke & Chemical Company.

Jones & Laughlin Makes Personnel Changes in Canada

The following changes in personnel affecting Canadian Operations have been announced by Jones & Laughlin Steel Corporation, Supply Division, Tulsa :

Preston V. Edwards, formerly of Williston, N. D. is now assistant manager of Canadian operations with headquarters at 415 Lancaster Building, Calgary, Alberta.

Ivor K. Thomas, a former employe, has rejoined the Jones & Laughlin organization as a special assistant credit manager with headquarters also at 415 Lancaster Building, Calgary, Alberta.

Edwards originally entered the employ of the J & L organization at Hutchinson, Kan., in 1941, and with the exception of two years in military service, he has been continuously employed by this company in several Kansas assignments and, more recently, as representative in the Williston Basin area.

Thomas has been a resident of Calgary for five years, having been in the employ of another supply company. He is a native of Pittsburgh and has spent his entire working life in the oil field supply business as a credit department representative.

Oil Well Supply Announces Gulf Coast Area Appointments

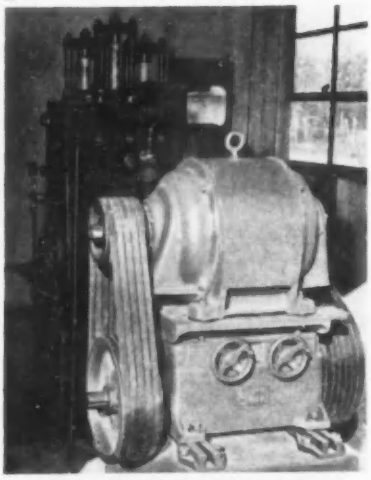
Harry A. Rowe has been named store manager at Beaumont, Texas, for U. S. Steel's Oil Well Supply Division. James T. Love has been appointed district engineer, refinery and pipe line sales for the Beaumont, Orange and Port Arthur, Texas, area.

Rowe was assistant to the district merchandise manager in the Houston warehouse prior to the new appointment. He began work for "Oilwell" in 1943. Love has been manager of the Beaumont store since 1950.

No "flame-out" with McKissick . . power steady as a jet!
McKISSICK
TRAVELLING BLOCK
for superior performance
Center or divider plate between each sheave minimizes center pin deflection.
Heavy steel construction throughout for extra weight.
All McKissick blocks are equipped with Johns-Manville Klipper Seals.
READILY ADAPTABLE TO ALL POPULAR HOOKS
(Illustrated is McKissick block with Webb-Wilson Hook)
Hydra Hook
McKISSICK
McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma

FOR WATER FLOOD PROJECTS

TURNER TRANSMISSION VARIES PUMPING SPEEDS EASILY AND ECONOMICALLY!



• The Turner Oil Field Transmission provides four speeds, 150, 218, 285, and 350 RPM, and does it with an 1800 RPM electric motor. It provides great flexibility of pump capacity and makes possible reduction of power costs by reducing peak loads as well as eliminating power-paid by-passed fluid. Reduces cost of V-Belt drive by use of low cost sheaves and belts. It pays for itself in a short time.

4 SPEED SELECTIONS

Model RMB, with hinged motor plate. Model HB is mounted with motor on H-beams with slide rails. Models available up to and including 50 H. P.

SEE YOUR LOCAL OIL FIELD SUPPLY STORE

TURNER UNI-DRIVE Company

3418 Terrace Street Kansas City 8, Missouri

FOR SWABBING

AUTO-RELEASE WIRE LINE STRIPPER

Finest in the field. King Strippers represent outstanding advances in design and construction that assure long life and maximum operating efficiency:

- POSITIVE LATCH will not release by accident or surge of pressure.
- SURE RELEASE MECHANISM operated by rope socket striking bottom of the stripper.
- NON-SPARKING MATERIALS minimize fire hazard.
- ROLLER WIRE LINE GUIDES on hardened steel pins.
- SIDE OPENINGS for inserting packing while line is in the hole.
- PACKING IS SELF-CENTERING; compression screws need not be evenly adjusted.

Export: R. S. STOKVIS & SONS
17 Battery Place, New York 4, N. Y.

KING OIL TOOLS

210 TERMINAL ST. HOUSTON 20, TEXAS OSage 3-3421

W. A. KIRKLAND
Executive Vice Pres., Chairman of the Executive Committee

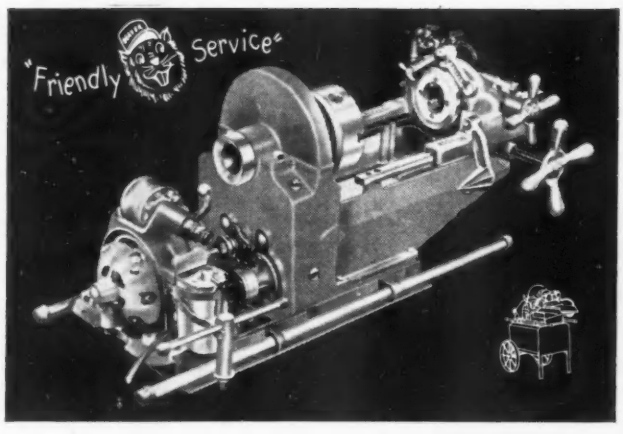
E. M. REED
Vice President

You'll meet old friends in the First National Oil and Gas Department

BUILT ON SERVICE 1st SINCE 1866

FIRST NATIONAL BANK *in Houston*

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION



Now Better than Ever... BEAVER Model-A

Two new improvements—patents pending—have been added to further increase the safety, convenience and performance of the Beaver Model-A ⅛ to 2" Pipe and Bolt Machine—popular the world over for the past 19 years.

1. The new Automatic Switch Lock and Chuck Wrench Holder makes it impossible to start the machine without removing the chuck wrench. This highly important safety device protects the workmen from personal injury and the machine against damage.
2. The new Eccentric Spool Pipe Centering Device is detached from the rotating spindle. It prevents the "whip" of long revolving lengths of pipe from rocking the spindle and causing flat-sided leaky threads.

And don't forget—there are 192 different kinds and sizes of dies available, in stock, for your every requirement when you own a Beaver Model-A. This die inventory, representing an investment of more than $150,000, is the user's guarantee of maximum service. Sold by leading jobbers—everywhere!

Today—write for the new Beaver Catalog. Address: Beaver Pipe Tools, Inc., 254-300 Dana Avenue, Warren, Ohio, U.S.A.

BEAVER PIPE TOOLS

Rhome Named Sales Manager For Carlon Products Corporation

Rom Rhome has been appointed manager of sales, southwestern region for Carlon Products Corporation. Formerly associated with line pipe sales of Consolidated Western Division of U. S. Steel, Rhome will supervise sale of Carlon plastic pipe, fittings and coatings in the southwestern states. He will be responsible for the promotion of the use of Carlon pipe in the petroleum industry.

Rom Rhome

A graduate of the University of Texas and Harvard Graduate School of Business Administration, Rhome's primary assignment at Consolidated Western was the sale of pipe to oil and gas pipe line companies. Prior to this he was in the sales department of U. S. Steel in Pittsburgh, Pa. In his new job Rhome will establish his sales offices in Fort Worth, Texas.

Le Roi Company Announces Formation of New Division

Le Roi Company, Milwaukee manufacturer of internal combustion engines and construciton and mining equipment, has announced the formation of a new division for the manufacture of front end loaders and truck mounted mixers. N. M. Sedgwick, formerly general sales manager for Le Roi's construction and mining division, will be general manager of the new division, which will be known as the Le Roi-Transo Division.

W. D. Lund

W. D. Lund, formerly assistant to general sales manager, Construction and Mining Division, will be assistant general manager of Le Roi-Transo. Management of the new division will be centralized in Milwaukee while actual production will take place in Coldwater, Mich., and Dunkirk, Ohio.

R. H. Rodolf, manager of rock drill sales for the Cleveland Rock Drill Division, becomes general sales manager of the Construction and Mining Division. C. L. Meigs is named manager of portable compressor sales and A. J. Jensen named assistant to the general sales manager, Construction and Mining Division.

Security Engineering Names Gillett to Administrative Post

Roland Gillett has been named administrative assistant to the general sales manager for Security Engineering Division, A. M. Birnie.

A graduate of Drury College, Gillett joined Security in 1948 in Whittier, Calif. Later he was placed in charge of inventory control and in 1950 promoted to office manager of the Odessa, Texas, office. In 1952 Gillett left the company but returned to Security to assume his new post.

Parkersburg Announces Executive Appointments

A. Sidney Knowles, president of The Parkersburg Rig & Reel Company, recently announced several elections and appointments affecting executive personnel.

W. V. Rathbone was elected first vice president with general supervision over sales, engineering and purchasing activities. His headquarters will be moved from Parkersburg, W. Va., to Houston. Rathbone, who joined The Parkersburg Rig & Reel Co. as vice president in April 1948, was previously associated with Standard Oil Company (N. J.) as sales manager of the Enjay Company, an affiliate which handles the sales of petrochemicals and synthetic rubbers. In 1949 Rathbone was elected vice president and general manager of Parkersburg.

A. G. Evans-Lombe, elected vice president and general sales manager, will continue to make his headquarters in Fort Worth, Texas, where he has resided and maintained his office since 1950. Evans-Lombe was with the O.C.S. Co. at the time this company was absorbed by Parkersburg and was appointed general sales manager in 1942. He was elected vice president-sales in 1944.

J. D. Lowd, assistant general manager at Houston, in connection with pressure vessel operations, has been appointed western sales manager and transferred to Fort Worth. Lowd joined Parkersburg in 1940. In his new position, he will continue to be active in pressure vessel work.

J. Q. Callaway, assistant to vice president, was appointed eastern and export

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Screen Bed Sets on Rubber Mounts
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In addition to the above outstanding advantages, Thompson Shale Shakers will withstand much abuse due to their heavy steel, all welded construction. They are also coated against corrosion and rust. For economical operation, you can depend on a Thompson Shale Shaker, so make *Thompson* a part of your standard equipment.

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Correlation with formation source
Suitability for boiler purposes
Suitability for make up water

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sales manager with headquarters in Parkersburg. Callaway has been with Parkersburg since this company absorbed the O.C.S. Company. In 1945 he was transferred from Coffeyville to Parkersburg and appointed manager of the Parkersburg sales office.

W. H. Fitzer has been transferred from the Gulf Coast Division office at Houston to New York and appointed assistant export sales manager. He joined Parkersburg as a sales engineer in 1947.

C. P. MacDonald, export sales manager, has been appointed assistant to the president and transferred to Parkersburg, W. Va. A graduate of Virginia Military Institute, MacDonald joined Parkersburg in 1934. He was employed in the Engineering department and later was transferred to the Gulf Coast as a field engineer. He also spent some time on special duty in Iran and New Zealand.

In the manufacturing division, G. E. Oller, assistant general manager, has been appointed eastern works manager in charge of the plant at Parkersburg and the foundry at Pomeroy, Ohio. Oller is a graduate of Lehigh University and has been with the company since 1930. Prior to joining the manufacturing division, he was employed in the sales division as a sales engineer and manager of various sales offices in Texas, Michigan, and Washington, D. C.

Texas Tool & Machine Celebrates Anniversary

Texas Tool & Machine Company has celebrated its eighth anniversary by officially opening the new plant and offices at 1100 McCarty Drive, Houston. William G. Baker, president, has signed a long term lease on the new facilities to provide more than three times the space formerly available at the old location.

William G. Baker

Organized in 1945, by Baker and Johnny Ferguson of Wharton, Texas, the firm is a leader in the field of valve and christmas tree rebuilding. Recently Ferguson sold his interest to Baker.

Colorado Fuel and Iron Announces Sales Appointment

E. J. Byrnes, Jr., has been appointed assistant general manager of sales, Eastern Division, of The Colorado Fuel and Iron Corporation.

In June, 1925, prior to the merger with CF&I, Byrnes joined the then Wickwire Spencer Steel Company as an administrative assistant in the Springs and Formed Wire department, New York City. In 1938, he was made assistant product manager and in 1940, was promoted to product sales manager of the Springs and Formed Wire department.

In 1944, the sales office for the Springs and Formed Wire department was moved to the Morgan mill in Worcester, Mass. With his appointment as assistant general manager of sales of CF&I's Eastern Division, Byrnes will be located at the executive offices of the corporation in New York City.

Lane-Wells Announces Executive Appointments

Two executive appointments effective October 1 have been announced by Lane-Wells Company. John J. Neale, formerly

John J. Neale

Joseph M. Henderson

Gulf Coast Division manager, has been made assistant to the president and Joseph M. Henderson, formerly assistant Gulf Coast Division manager, has been advanced to the post of Gulf Coast Division manager.

A graduate of Texas A & M College, Neale began with Lane-Wells in 1936 as a loader. Later he was gun perforator operator, sub-district superintendent, division sales engineer, district superintendent, division sales manager, and Gulf Coast division manager, directing activities of that division and 40 branches in that area. He will move from Houston to Los Angeles.

Henderson, also an alumnus of Texas A & M, joined Lane-Wells in 1936 and has served as loader, rigman and operator, sub-district and district superintendent, assistant to the Gulf Coast Division manager and assistant Gulf Coast Division manager.

Denver Wofford Named Manager Of Reed Roller Bit Sales Division

Denver F. Wofford has been appointed manager of the Oklahoma Sales Division of Reed Roller Bit Company, replacing the late E. A. Miller. Wofford joined Reed 17 years ago as a salesman in the Texas Gulf Coast area.

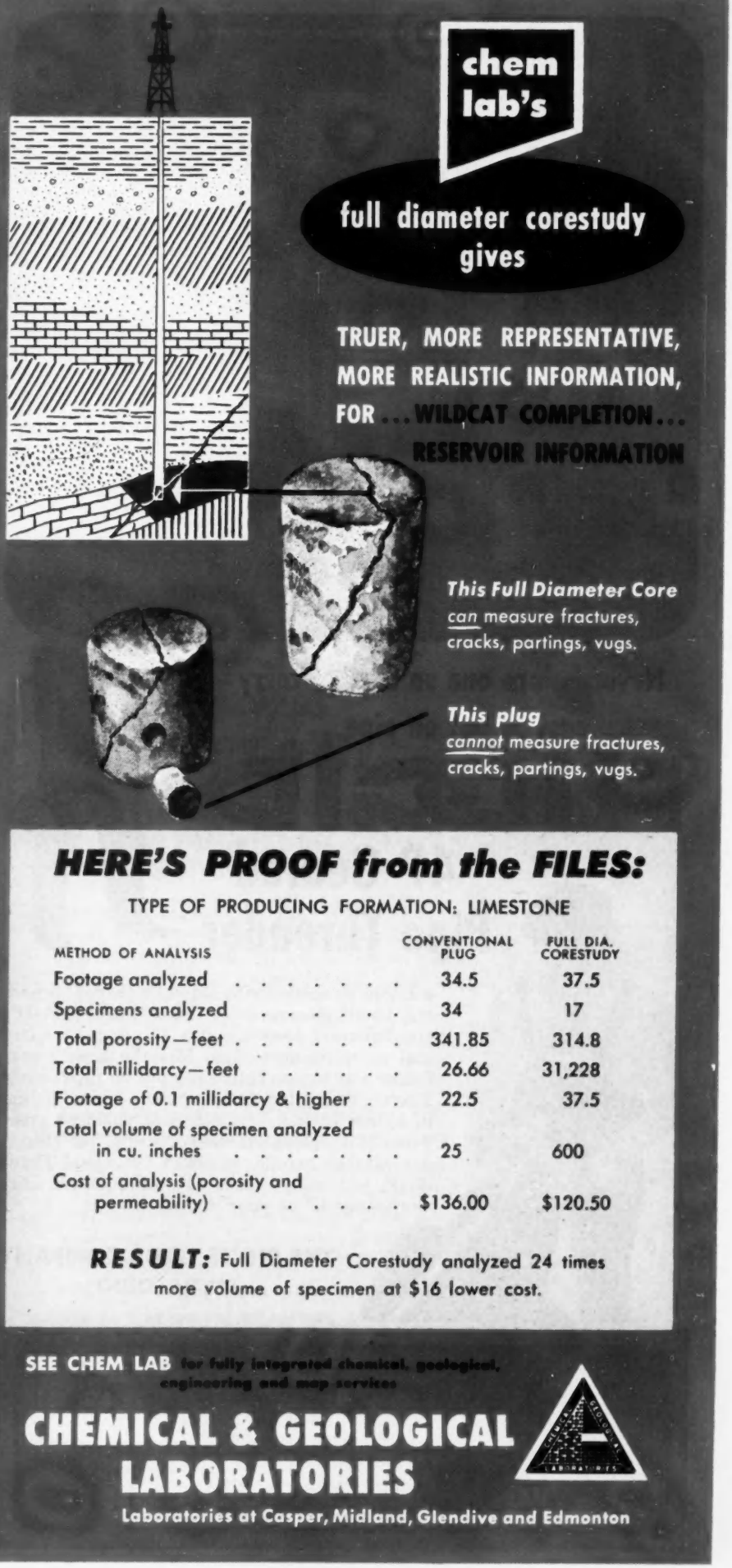
Denver Wofford

He has served in sales and engineering capacities in Mississippi, Texas, Wyoming, Canada, Venezuela and Oklahoma, before taking over the duties of Oklahoma Sales Division manager.

Universal Atlas Cement Promotes Two Executives

Two executives of Universal Atlas Cement Company have received promotions following the retirement of George H. Reiter, executive vice president. Charles B. Baker is elected executive vice president and Donald C. Leo, secretary, is appointed general attorney. Both will have offices in New York.

Baker joined the company in 1942 and became secretary and general attorney the following year. In 1949 he was appointed assistant to president and elected vice president and general attorney in 1951. Leo joined the company in 1943 and was elected secretary in 1951.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This Full Diameter Core can measure fractures, cracks, partings, vugs.
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TYPE OF PRODUCING FORMATION: LIMESTONE
METHOD OF ANALYSIS | CONVENTIONAL PLUG | FULL DIA. CORESTUDY
Footage analyzed 34.5 37.5
Specimens analyzed 34 17
Total porosity—feet 341.85 314.8
Total millidarcy—feet 26.66 31,228
Footage of 0.1 millidarcy & higher . . 22.5 37.5
Total volume of specimen analyzed in cu. inches 25 600
Cost of analysis (porosity and permeability) $136.00 $120.50
RESULT: Full Diameter Corestudy analyzed 24 times more volume of specimen at $16 lower cost.
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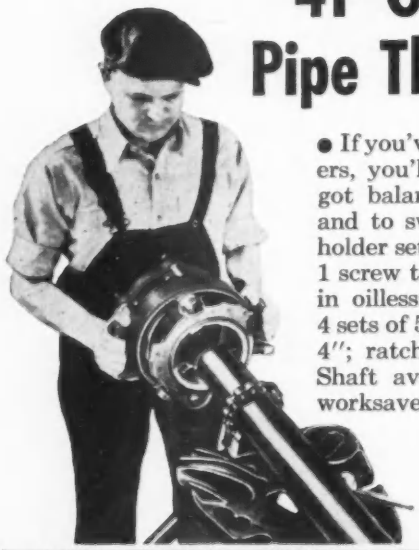

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Decker Joins Sales Force Of Spang and Company

Merle Decker

Merle G. Decker of Marietta, Ohio, has joined the sales force of Spang & Company. Experienced in the drilling business, Decker has been with the Ohio Fuel Gas Company as driller and toolpusher for 15 years. He comes to Spang & Company from the Acme Fishing Tool Company, for whom he has acted as sales representative since 1937.

New York Belting and Packing Announces Sales Promotions

The following appointments in the sales division of New York Belting and Packing Company have been announced by Joseph A. Conlon, vice president.

Named to regional sales manager posts were Wenzel A. Lindfors and Carl G. Link. Link will handle the Great Lakes region including the heavily industrialized Chicago, Pittsburgh and Detroit areas; Lindfors will supervise sales in the rest of the country.

Wilbur E. Combs was appointed merchandise manager and Harry H. Raber sales operating manager, both of whom will be headquartered at the company's Passaic, New Jersey offices.

Walling Heads Department Of Kaiser Division

Jack W. Walling has been appointed manager of industrial relations for Kaiser Engineering Division of Henry J. Kaiser Company. Walling formerly was assistant to vice president, operations, at the Fontana Works of the Kaiser Steel Corporation and was responsible for the Fontana Steel Plant's Legal, Industrial and Public Relations departments.

In his new position, Walling will have charge of the engineering-contractor firm's widespread industrial relations. Walling joined Kaiser Steel in 1942 as an attorney in the Legal and Industrial Relations department. He is a graduate of the University of California's Hastings School of Law in San Francisco.

Tipton Named Sales Manager For U. S. Rubber Company

Warren A. Tipton has been appointed general sales manager of the mechanical goods division, United States Rubber Company, succeeding Walter F. Spoerl, who is retiring after 45 years of service.

A graduate mechanical engineer from the University of Illinois, Tipton joined the company as a salesman in the Houston, Texas, office in 1935. After a series of promotions he became sales manager of the mechanical goods division in 1952.

Spoerl began in the company's Chicago sales office in 1908. After rising through various sales and administrative posts, he moved to the New York offices in 1934 as assistant manager of branch sales. He was named merchandise manager in 1944 and general sales manager for the division in 1946.

Cooper-Bessemer Appoints Smith to Seattle Staff

Appointment of Todd W. Smith to its Seattle, Wash., office has been announced by The Cooper-Bessemer Corporation, Mount Vernon, Ohio. The assignment as sales and engineering representative will be under the direction of C. R. Jones, branch manager of Cooper-Bessemer's office and warehouse facilities in Seattle.

Todd W. Smith

A mechanical engineering graduate from University of Toronto, Smith has been associated with the Cooper-Bessemer engineering and manufacturing plant in Mount Vernon, Ohio. Prior to this, he was an engineer with Ford Motor Company.

Smith's activities will be devoted principally to the engineering application of heavy internal combustion engines, as well as compressors and pumps in the northwest sector of the U. S.

Kearney To Be Representative For Tex-Tube in Texas

A recent addition to the Tex-Tube, Inc. sales force is Raymond W. Kearney, Jr., of Houston. He will represent Tex-Tube in the west and southwest areas of Texas. Kearney has served two tours of duty with the Air Force as a reserve officer in World War II in the far East, and later in Armed Forces Special Weapon Project, military counterpart of the A.E.C., during the Korean War. His civilian experience includes ten years of oil field sales and service work in equipment, corrosion control and oil treating.

Raymond H. Kearney, Jr.

Sherman Products Sends Equipment to Foreign Markets

Sherman Power Diggers are now available in foreign countries, according to an announcement by Sherman Products, Inc., Royal Oak, Mich.

First developed in the United States in 1948, Sherman tractor mounted, hydraulic "backhoe" type power diggers have been produced in larger numbers than any other in this field. Thousands are now in use in oil fields, building construction, public utility operations, in plumbing and cemetery service and other industrial lines. They have been found particularly adaptable to many excavating and trenching jobs where giant digging equipment and manual labor have both been found impractical.

Sherman Power Diggers are handled by the company's export office in Washington, D. C. through Ford, Fordson Major, Ferguson, International Harvester or Case tractor distributors in foreign markets.

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A PERFECT SEAL!
THERE'S A CATAWISSA PERFECT SEAL UNION FOR EVERY USE . . . ALL TEMPERATURES, ALL PRESSURES!
The full dependability of HOT FORGED STEEL is yours in a Catawissa Union (hot forged from solid steel bars) with several extra value features that are exclusive here at the UNION SPECIALISTS!
All Catawissa Unions are designed to give a 3-to-1 SAFETY FACTOR . . . 3,000-lb. service unions are tested to 9,000-lbs., 6,000-lb. service unions tested to 18,000-lbs., etc.
Exclusive Ball-to-Angle seat design assures a PERFECT SEAL even when the pipe is not in alignment!
Machining operations assure a UNIFORMITY AND ACCURACY heretofore found only in special fittings and, with rigid inspection both during and after machining, guarantees LEAKPROOF CONSTRUCTION!
Satisfaction is guaranteed in any application—whether it be general low pressure service or extremely high pressures and temperatures (for air, oil, gas, chemicals, hot oils, gases or steam).
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RATES: Regular Classified (undisplayed) set in this size type: 12 cents per word. Minimum charge, $3. Blind box address in our care counts six words. Replies forwarded without charge. **Situation wanted** ads, 6 cents per word. **Display ads**, set in suitably larger type with ruled border, $12 per column inch; situation wanted display ads, $6 per column inch. Ten percent discount for two or more insertions of same copy in consecutive issues. **All classified ads payable in advance. COPY DEADLINE:** 5th of month preceding date of issue. Send copy and checks to: **Trading Post Section, World Oil, P. O. Box 2608, Houston, Texas.**

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■ Excellent opportunity for man with experience in secondard oil recovery by water flooding and who has formal training in microbiology to do sales and service work with firm well established in the field of industrial microorganism control. Training period, salary plus commission. All replies confidential. Write fully Box 90-W, c/o World Oil, Houston, Texas.

■ SALES ENGINEER—Agressive, experienced sales engineer to contact petroleum engineers, equipment engineers and purchasing agents on a line of specialty oil field equipment. Acquaintance with Houston, Dallas and Fort Worth personnel desirable. Exceptionally attractive proposition for the right man. Address reply to P. O. Box 2576, Dallas 1, Texas.

GAS LIFT ENGINEER

Must have actual experience in design and installation of gas lift equipment and complete gas lift systems. Sales experience desirable but not essential. Forward application with resume of training and business experience to E. L. Andrews. Replies held confidential if requested.

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Atlantic Building, Dallas 1, Texas

SITUATIONS WANTED

Drilling contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box 94-W, WORLD OIL, Houston 1, Texas.

■ Production Supervisor, Executive Assistant, Age 30, desires to relocate. B. S. Geology, University of Texas. Two years experience in Geophysics and Geology—major oil company—5 years production supervisory experience in Seamless Tube Mill—oil country goods—of Major Steel Company. Box 1-W, c/o World Oil, Houston, Texas.

INDUSTRIAL RELATIONS

Anthropologist, single, 29, excellent health; Fluent Spanish, some French, German. Seeks petroleum industry career in Industrial or Public Relations. Overseas preferred. Position must be challenging, demanding use of energy and imagination, where diversified scholastic, business, and oilfield background will prove valuable. Box 2-W, c/o World Oil, Houston, Texas.

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■ FOR SALE: Rambler H-40, IDECO with sub structure. Trailer mounted. C 350 Ideal and 7½ x 14 BA Emsco Pumps. Drill Pipe, Rotary Table, Block, Hook, Swivel, Kelly and Light Plant.

Cardwell Trailer-Rig. 7¾ x 18 Wheeland and C 12 Emsco Pumps. Drill Pipe, Rotary Table, Block, Hook, Swivel, Kelly and Light Plant.

Model RL CARDWELL Spudder, skid mounted with D 13000 Caterpillar Motor.

Wilson-Mogul double drum Draw Works with sub structure, Mast, G K U Waukesha motor.

FRANKS single drum Draw Works with Mast mounted on International L 190 Tandem Truck.

Two Drilling in Units consisting of Guiberson Head with Waukesha motor, skid mounted.

D. Jack Simmons, P. O. Box 213, Farmington, N. M., Phone 322R.

FOR SALE—USED HEATERS

1—National 300# Steam Condensing Heater, 24" x 7'6"—500,000 BTU/hr., N.B. #72, Serial No. DH 3512-78A, Dr. #DH 104 WP 300 PSI H.T. Surface 85 Sq. Ft.

1—Alcorn Combustion Co. Portable Type 7-HX Gas Fired Heater with 14 (7 each end) Selas Co. Refrak Screen Burners capable of delivering 802,000 BTU/hr. to 2900 lbs./hr. of 0.6 Sp. Gr. Natural Gas. Maximum safe working pressure 840 PSI.

The heaters are located at plant near Bloomington, Texas, and may be inspected after contacting N. E. Waldie, Purchasing Department, Humble Oil & Refining Company, Houston, Texas.

■ TWO 150 horsepower F and T boilers located at Eunice, New Mexico. Makin Drilling Co., Box 131, Hobbs, New Mexico.

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H. K. Porter Company Acquires Interest in A. Leschen & Sons

H. K. Porter Company, Inc., Pittsburgh, has acquired a controlling interest in A. Leschen & Sons Rope Company, St. Louis, Mo. The Leschen Company, established in 1857, supplies wire rope for oil and gas drilling, elevators, marine uses, derricks and cranes, bridges, water well and blast hole drilling, rope slings, and other purposes. Operations will continue as Leschen Wire Rope Co., a division of H. K. Porter Company, Inc. under the direction of D. W. Vernon, vice president-general manager. A. A. Leschen, former president, has expressed a desire to retire from active business.

In recent years Porter's diversification policy has resulted in the company's entrance into the manufacture of rubber, steel, electrical equipment, forged steel fittings, hydraulic presses and equipment and wire rope through the acquisition of Quaker Rubber Corporation, Connors Steel Division, Buffalo Steel Division, Delta-Star Electric Division, Watson-Stillman Company, and Leschen Wire Rope Company.

Oakite Products Announces Promotion of L. W. Cunningham

L. W. (Larry) Cunningham, technical service representative in the Shreveport area of Oakite Products, Inc., has been appointed to the company's new Beaumont field territory embracing southeastern Texas, central and southwestern Louisiana.

A member of the company's field organization since 1947, Cunningham comes to his new position after broad experience in petroleum industry cleaning and related operations. He will make his home in Beaumont, where he will be available for technical advisory service in connection with petroleum industry cleaning and associated procedures.

Maloney-Crawford Opens Two Branch Offices

New branch offices have been opened at Hobbs, N. M. and Healdton, Okla., by the Maloney-Crawford Tank & Manufacturing Company. Both locations offer stock and services.

Personnel at Hobbs includes H. H. Guthrie, branch manager; Bill Brock, field man; and T. E. Goodwin, in charge of the warehouse. Employes at Healdton are L. W. Moseley, branch manager, and G. W. Martin, in charge of the warehouse. Q. B. Johnson is field man.

Canadian Organization Is Formed by Stratoflex

Ken W. Davis, president of Stratoflex, Inc., has announced the formation of a new organization—Stratoflex of Canada, Inc.—from the Fort Worth headquarters of the organization.

Officers of the Canadian organization include K. W. Davis, president; T. G. Preston, vice president and general manager; W. R. Cook, vice president, and N. E. Barber, secretary-treasurer.

T. G. Preston will head the Canadian operation. W. S. Matthews is chief inspector and K. J. Tsujimura is chief engineer.

Occupying a new building on Kipling Avenue in West Toronto, Canada, Stratoflex of Canada, Inc. will manufacture and distribute aircraft and industrial hoselines with detachable and reusable fittings; also other associated products.

New Books, Maps and Movies

GRAPHIC PROBLEMS IN PETROLEUM GEOLOGY, L. W. LeRoy, head of the Department of Geology, Colorado School of Mines, Golden, Colo.; and J. W. Low, regional stratigrapher of The California Company, Harper and Bros., 1954.

This manual, to be published by Harper and Brothers soon after the first of the year, was incorrectly reported in a review in the July issue to cost one dollar. To date no price has been set. The manual will incorporate 31 problems dealing with various phases of stratigraphy, structural geology and oil field development. The volume will be spirally bound, 8½ inches by 11 inches in size.

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PETROLEUM IN THE WESTERN HEMISPHERE, Report of the Western Hemisphere Oil Study Committee of the Independent Petroleum Association of America, 1437 South Boulder, Tulsa, Okla., October, 1952.

The 180-page book contains findings of an extensive study of Western Hemisphere petroleum resources conducted over a two-year period by an industry committee composed of 44 experts in petroleum economics, production, geology, law and engineering. It provides an analysis of future availability of petroleum in the Western Hemisphere countries through 1960 and establishes a formula for predicting future conditions in the petroleum industry as related to production, demand, imports, income, drilling, reserves and productive capacity. In a foreword to the book, IPAA president Charlton H. Lyons, notes that "the findings of this study demonstrate that neither the U. S. nor the Western Hemisphere need ever be short of petroleum products in the foreseeable future."

•

ELECTRIC LOG CROSS SECTIONS OF THE WILLISTON BASIN, North Dakota Geological Society, Box 1123, Bismarck, N. D.

The North Dakota Geological Society has available for distribution three correlated, electric log cross sections of the Williston Basin, comprising 50 key wells. One section runs from the Virden Pool in Manitoba through central North Dakota into north central South Dakota. This cross section is in three parts. Two east-west cross sections, both starting in Montana, run across the northern and southern part of North Dakota. Each east-west section is in two parts. Price is $21 for a complete set of three cross sections, $10 for the north-south cross section, or $3.50 for any portion of any of the three cross sections. Orders may be placed with the society.

•

THE DIESEL STORY, Shell Oil Company, 1952.

This 16-mm film tells of Rudolf Diesel's great triumph in developing one of the world's most efficient forms of motive power, the diesel engine.

OUTLINES OF STRUCTURAL GEOLOGY, Third Edition, E. Sherbon Hills, John Wiley & Sons, 440 Fourth Avenue, New York 16, N. Y. $3.

Hills, professor of geology and mineralogy at the University of Melbourne, has had an opportunity to study the changes during the past decade in the tenets of structural geology. His foremost purpose is to present all worthy points of view on controversial topics that have been advanced during this period. It includes discussions on non-diastrophic structures, rock deformation, mechanical principles, major crustal structures, folds and faults, structures of igneous rocks and petrofabric analysis. A large bibliography, drawn from world literature in structural geology, supplements the text while special attention to nomenclature further amplifies the volume's reference value.

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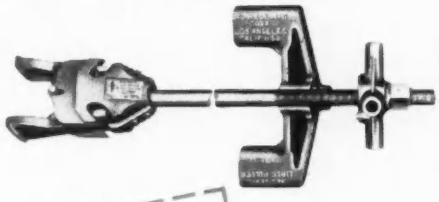

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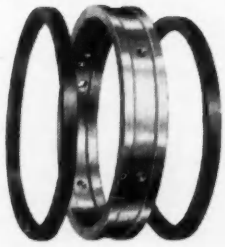

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for full information on Red Devil Products or write for price catalogs. Red Devil Products are available through your supply store.

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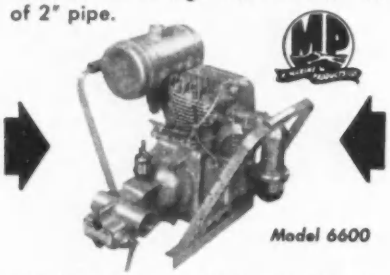

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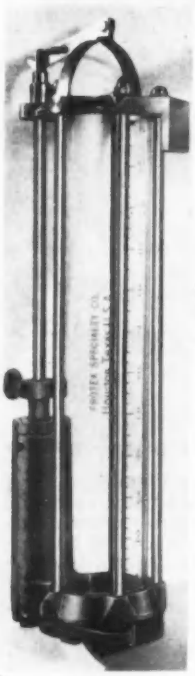

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SQUEAKS from the BULLWHEEL

Business Mind

They were watching a very attractive rhumba dancer, and the businessman followed her movements as if entranced. "Well," said his wife, "I'm glad to see that *something* can take your mind off business."

"Quiet," growled the executive, still watching the shapely hip-twister. "I've got an idea for a new type of agitator in our washing machine."

•

Standard Equipment

"These lovely soft hands," he whispered. "That hair. And those beautiful eyes! Where did you get those beautiful eyes?"

"They came with the head," the girl answered icily.

•

American Vacation

A Russian wolf-hound came over to this country and met an American dog.

"How are things in Russia?" asked the latter.

"Oh, fine, fine," said the Russian dog. "We have fine dog houses and all the red meat we can eat each day."

"Then what are you doing over here?" asked the American pup.

"Heck," said the Red dog, "a fellow likes to bark once in a while."

•

Robbery and Murder

A canny Scot was engaged in an argument with the conductor as to whether the fare was to be five or ten cents. Finally the disgusted conductor picked up the Scot's suitcase and tossed it off the train just as they were crossing a long bridge. It landed with a mighty splash.

"Hoot Mon," screamed Sandy. "First you try to rob me and now you have drowned my boy!"

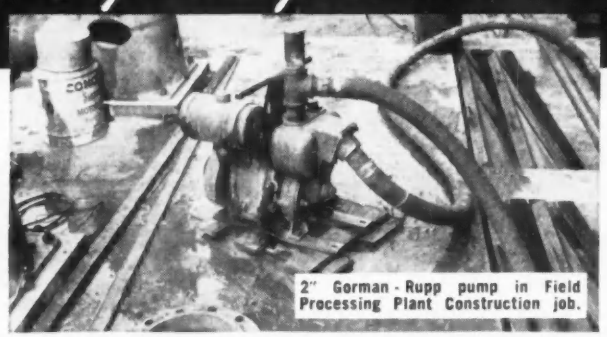
•

Frankly Speaking

Cogswell had taken up the saxophone and had become pretty unpopular in the apartment house. He was riding down in the elevator one morning and met another tenant. "Tell me honestly," he said to the neighbor, "does my practicing make you nervous?"

"Well, it used to, when I first heard the other tenants complaining about it," the neighbor replied, "but now I don't care what happens to you."

HIGH CAPACITY *Lightweight* PUMPS



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Good Reason

"How come you don't go with Toots anymore?"

"I couldn't stand her vulgar laughter."

"I never noticed it."

"You weren't there when I proposed."

•

Worm Preventive

A teacher was trying to explain to her class that drinking whiskey was very bad and would ruin the health of anyone who consumed it. Finally, in order to make the class understand better she decided to show them by example.

She brought into class two glasses and two worms. One glass was filled with water, and the other glass was filled with whiskey. She dropped one worm into the water, and it swam around contentedly. The second worm she dropped into the glass of whiskey, and it curled up and died.

Then she asked the class if they understood the moral she was trying to teach. Little Johnny, in the back of the room, waved frantically, so the teacher asked him if he knew the moral of the little demonstration. Johnny answered brightly, "Sure. Always drink whiskey and you'll never have worms."

•

Debt Collecting

The maid was ill. Her mistress sent for the doctor, who, upon arriving, asked the lady to leave the room during his examination. When the maid was alone with the physician she confessed, "Doctor, I'm not really ill. She owes me six weeks salary and I'm not getting out of bed until she pays me."

"She owes me for the last ten visits I've made her," said the Doc. "Move over."

•

You Should Know!

The mother, in an affectionate mood, said to her son, aged five, "And whose little boy are you?"

The kid withered her with a scornful look. "Hell," he said, "Don't tell me YOU don't know!"

Hereafter, all questions pertaining to your expense account will be referred to Mr. McFarland, here!

The Newborn

A new father was looking at the babies through the window of the infant ward, and it seemed that every baby there was crying.

"Why are they bawling?" he asked the nurse.

"Listen," she said severely, "if you were only a few days old, without any clothes, out of a job, and owed the government almost $1700 on the national debt, you'd be bawling too!"

•

Sound Effects

The story is told of a gentleman at a swank banquet. Every now and then he would burp. The lady seated next to him became quite put out and stared at him in undisguised horror. But the gentleman was equal to the occasion.

"What do you expect, Madam?" he asked, "Chimes?"

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Identify Yourself

First Drunk: "I found (hic) a half dollar."

Second Drunk: "It'sh mine. It'sh got my name on it."

First: "What'sh your name?"

Second: "E Pluribus Unum."

First: "Yeah, it'sh yoursh."

•

Facts of Life

Little Boy: "Mama, where do elephants come from. And don't try to stall me off with that gag about the stork!"

•

Who Are You?

The new head man of the insane asylum was trying to convince an inmate that he was not Napoleon.

"I know dern well that I am Napoleon!"

"Who told you so?" asked the man.

"God did," replied the inmate.

A voice from the next bunk, "I did not."

•

Frugality

Donald and Mary McTavish decided to adopt a child, and asked at the orphanage for a little girl. One was produced and Mary was about to close the bargain when Donald tapped her shoulder.

"Mary," he whispered, "let's take a wee lad. Hae ye forgotten the lad's cap we found in the train?"

•

Incognito

The hillbilly with a dizzy blonde hanging on his arm, took the pen handed him by the hotel clerk and signed the register with an X. With a thoughtful look on his face, he hesitated, then circled the X.

"A lot of people signed with an X," said the clerk, "but this is the first time I've ever seen one circled."

"T'aint nothin' so dadburned odd about hit," replied the hayseed, "when I'm running 'round with wild women I don't use my right name."

•

Hard Times

The gas company in a small college town inserted the following ad in the local newspaper: Wanted: Hard boiled, beauty-proof man to read meters in sorority houses. We haven't made a dollar in two years.

•

Bop Talk

Two bopsters were walking down the street in London on a particularly foggy day. One bopster turns to the other and says, "Man, dig this crazy steam room."

Boids Is Boids!

It was springtime in England, and the Brooklynite visiting a London park was overwhelmed by the number of sparrows milling about the lawns. He tapped lightly on the shoulder of the Englishman standing next to him.

"Hey, Mac, didja ever see so many boids!"

"My good man," said the Englishman, with a reproachful look, "Those are not Boids, they're Birds."

The Brooklynite scratched his head thoughtfully. "Dat's funny," he mumbled, "dey choips just like boids."

•

Not So Foreign

Wife (reading an oddity): "It says here that in India a man doesn't know his wife until they are married.

Husband: "That ain't the only country."

•

Voice of Experience

Six Yanks were crouched in a Korean rice paddy when an enemy shell landed nearby, spraying them with mud and rice.

"We're in a tight spot here!" growled one of the soldiers.

"Brother," said a young man who had twice been married and divorced, "You're always in a tight spot when they start showerin' you with rice!"

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